

COLORADO MESA
UNIVERSITY

AY 2018 - 2019
Program Review

Biological Sciences
Colorado Mesa University

BIOLOGICAL SCIENCES

Program Review

AY 2018-2019

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I. INTRODUCTION AND PROGRAM REVIEW

Biological Sciences Program Review 2018-19

I. INTRODUCTION AND PROGRAM OVERVIEW

A. Program Description

The Biology program offers multiple Bachelor of Science (B.S.) degrees, an Associate (A.S.) degree, and minors in Biology and Forensic Science. Within the B.S. degree, there are multiple tracks: B.S. in Biology; B.S. in Cellular, Molecular, and Developmental Biology (CMDB); B.S. in Ecology, Evolution and, Organismal Biology (EEOB); and B.S. in Secondary Science Education. The A.S. degree is in Liberal Arts with a Biology emphasis. The department administers minors in both Biology and Forensic Science.

B. History

The Biology program officially began in 1974 as a two-year program with three faculty members. In the same decade, the program converted to a four-year program under Mesa State College. Currently, Colorado Mesa University offers certificate programs, Associates degrees, Bachelors degrees, and a limited number of graduate programs.

In the last two Biology program reviews, 2006 and 2013, the department had twelve full-time Tenured/Tenure Track (T/TT) faculty. In the 2013 program review, the faculty consisted of fourteen tenured/tenure-track faculty with two in transitional retirement working part-time, 4.5 full-time instructors, and seven part-time lecturers, two of whom were teaching 10 or more credit hours per semester. The program had one full-time laboratory coordinator/staff.

Currently, the Biology program has sixteen T/TT Faculty members, seven full-time faculty, and seven part-time lecturers. Our full-time faculty include four instructors, two faculty with split positions, and one emergency hire. Our seven part-time lecturers teach online classes or courses at the Grand Junction and Montrose campuses. The program has a full-time Laboratory Coordinator/Staff and has added an Assistant Laboratory Coordinator/Instructor. This position is considered an Instructor faculty position since some laboratory teaching is required. The Assistant Laboratory Coordinator took over the responsibility of ordering lab supplies from the Laboratory Coordinator.

In 2006, nearly 70% of the faculty members were tenured full professors, then in 2013 42% were tenured full professors, and currently 17% of the department faculty are tenured full professors. In the last four years we have replaced five faculty members. Four of the replacements were of T/TT positions.

C. Recommendations from the Previous External Review (on CMU assessment website)

The external reviewer found many positives in our department. Some of the positive findings were that faculty created a caring learning environment, that faculty were hard-working, and that the physical resources and the equipment were more than adequate. The reviewer felt that the

most exemplary aspect of the program was the available undergraduate research opportunities, which was due to exceptional faculty effort.

A summary of the positives stated in the 2013-14 Biology Program Review:

Reviewer positives:

In summary, undergraduate research, diversity of courses in the catalog, location of university, increased admissions as biology majors, core of eager and active faculty, addition of concentrations in the curriculum, development of two-year schedules of courses, development of assessment, library support, distance learning support, IT support, and facilities are all positive aspects of the Department.

A summary of the negatives stated in the 2013-14 Biology Program Review:

The reviewer concerns:

The primary concern was the number of tenured/tenure track faculty. Increase in the tenure track faculty would enhance many aspects of an already hard-working and arguably overburdened department. Time outside of teaching responsibilities is a close second and would be helped with more faculty to reduce teaching and advising loads. Reasonable (but not the current formula) reassigned time should be implemented.

Undergraduate research opportunity is a negative because there are currently too few research-oriented faculty, and with an eager and available student body this should be expanded as much as possible. Course scheduling to avoid conflicts of required biology courses is a must. The quality of part-time instructors is an issue. Teaching concentration is not nationally recognized.

The negative that the reviewer considered to be of highest priority and pointed out multiple times was that the Biology program lacked sufficient numbers of tenured/tenure-track faculty and full-time instructors. The reviewer recommended that the department add additional T/TT faculty to facilitate undergraduate research, promote effective advising, and provide course catalog curriculum coverage. While the department has submitted position requests, the majority of new hires have been replacements, not new faculty lines. New types of positions have been added: Laboratory Instructor and Assistant Laboratory Coordinator/Instructor, which has reduced the laboratory teaching loads for T/TT faculty. The total number of full-time Biology faculty on the CMU campus has increased from 2013 to 2019 by 2.5 full-time (FT) faculty. The faculty staffing pattern in the departmental data is not always reflective of actual patterns. Some reasons for this are that (i) transitional faculty are no longer tenured, (ii) tenured faculty who move to administrative positions are still listed as faculty in departments, and (iii) instructors often have dual positions so they only teach part-time or the faculty teach at the Montrose campus but are combined with the CMU main campus faculty. The Montrose campus courses are limited in number, and course enrollment is significantly less than for CMU courses at the main campus. For example: Fall 2019 main campus BIOL 209 Human Anatomy & Physiology I lecture has enrollment capped at 75 students (five sections plus an online section), while the Montrose campus has enrollment capped at 24 (one section).

The total SCH has increased since the last review in 2013. Student credit hours increased from 2014-15 SCH=15,890 to 2018-19 SCH 17,138. This is an increase of 1,248 SCH. Taking this number and calculating the number of additional sections that would need to be added results in 21 sections. This would be a combination of 6 lectures and 16 labs. This was calculated by taking the 1,248 SCH with 70% of the SCH used for 3-credit lecture courses of 50 students and

the other 30% of SCH used for 1-credit labs with 24 students. In actuality, the department has added only 17 additional sections of lecture/lab courses in AY2018-19. BIOL 387, 487, 493, 495, and 499 are counted as sections, but these courses are not counted toward faculty load so those sections were excluded from the count. These excluded courses comprise students enrolled in research, internships, independent study, or teaching practicums with Biology faculty members. More than half of the additional sections have been Essential Learning courses benefitting non-majors (Appendix A).

Year & category	Sections	Non-faculty load course sections or courses not counted toward Biology SCH	Section totals	Difference calculation	Difference
2014-15					
Biology total of all courses	300	-51 (BIOL 387, 487, 495 & 499)	249		
Essential learning	82		82		
2018-19					
Biology total of all courses	298	-32 (BIOL 387, 487, 495 & 499)	266	249-266=	Total additional sections =17
Essential learning	92	-1 (Milestone courses)	91	91-82=	Additional essential learning sections =9

The Biology department's inability to add all the additional sections of courses has resulted in larger class sizes. Biology classes that had traditionally been capped at 36 now have caps of 48-50. Many of our upper-division courses are capped at 40 and fill quickly. The biggest impact has been in laboratory sections, which often exceed our laboratories' original cap of 24 students. The Biology department faculty have also reduced the number of sections that engage students in undergraduate research since this is not counted in a significant way toward teaching load during the academic year.

The reviewer was concerned that the ratio of full-time equivalent students (FTES) to full-time equivalent faculty was high in 2013-14, FTES: FTEF= 24.0, but that number currently is higher, 2018-19 FTES: FTEF= 25.2. The department continues to address the issue of high full-time student to full-time faculty ratio by submitting position requests regularly. All of the Biology T/TT faculty who have left the institution due to retirements or resignations have been replaced, but new position requests are often not approved. The department did address salary equity in the last budget cycle, which resulted in some lower paid faculty receiving raises to equitable levels.

The 2013-14 external reviewer was concerned that the Biology department morale was at a tipping point and that workload with its heavy teaching responsibilities, inadequate lab load formula, and the near lack of reassignment time for research would result in a negative outcome. Within the last four years, we have had five resignations of full-time faculty, and all of those positions have been replaced but the number of new hires has been minimal.

Morale will be addressed with the department continuing to submit justification requests for full-time T/TT and instructor positions in the fall semester. This fall the department has requested a T/TT cell physiologist and an instructor position. Both would be new lines.

The number of replacements of senior faculty has resulted in a department heavy in non-tenured Assistant Professors. The recent hires all have a desire to participate in scholarly research, which will strengthen our undergraduate research. In the past, a smaller percent of Biology faculty provided students with undergraduate research opportunities, but more recently the department has hired faculty with a strong desire to combine teaching with research. The CMU professional handbook has recently added language and evaluation criteria that strengthen the institution's desire to pursue the Teacher-Scholar model. The Teacher-Scholar model engages students in scholarship in ways that develop rigorous critical thinking. While scholarship is strongly encouraged, teaching remains the primary responsibility of faculty at CMU.

To mitigate the effects of a heavy workload (teaching, scholarship, service, and advising), the Biology department faculty assist new faculty in classroom preparation, train them to teach multiple section laboratories, and facilitate research startup.

While the physical assets in the Biology department were sufficient in the 2013-14 department review, the reviewer predicted that space would become an issue as the department expanded teaching and research programs. The department has addressed this issue by repurposing WS 151, a room previously dedicated to an ancient Electron Microscope. This space was remodeled to be used by 18-student-capacity laboratories or as research space. This space has allowed labs with small student numbers to be taught at times compatible with student schedules.

The reviewer also noted that institutional monies are minimal to support scholarly activities. This has been addressed directly by faculty in the Biology department. The department has partnered with St. Mary's Hospital, Saccomanno Research Institute to develop the Saccomanno Internship Program in Biological Research (SIPBR). This collaboration to form SIPBR has allowed CMU Biology students to receive compensation while conducting a ten-week summer research project under the supervision of Biology faculty mentors. Students are then given the opportunity to present their research at a SIPBR symposium. SIPBR compensates the student interns and the Biology faculty supervisors, thus supporting scholarly activities. The SIPBR internship program has recently been expanded to support internships that extend through the academic year. This collaboration was established by Dr. Kyle McQuade, Full Professor, and five to seven students have participated annually. The collaboration has also resulted in a sizable donation of research equipment from the Saccomanno Research Institute and Internship grants totaling \$240,000.

To facilitate the success of undergraduate research, the Biology department also actively participates in fundraisers with CMU Foundation support. BIOSINQ was initially set up by Dr.

Thomas Walla, Full Professor, to facilitate the pursuit of scholarly activities. The BIOSINQ fund is administered through the CMU Foundation and is used to cover some of the costs associated with the purchase of equipment and supplies for research. It also has been used to supplement travel costs for both faculty and students to conferences.

The Biology faculty also actively request institutional funding by applying for Faculty Development grants. Several faculty have external grants funded by local state and federal agencies. These grants are administered by the Office of Sponsored Programs.

The Biology department faculty have been creative, collaborative, and generous in the acquisition of scholarship funding. The acquisition of funding sources has been instrumental in the success of Biology faculty research with undergraduate student involvement. By facilitating new T/TT faculty research programs, the department will be able to retain high-quality faculty members.

The final negatives from the 2013-14 review concerned curriculum, assessment, and the lack of NCATE recognition of the teaching concentration.

The reviewer supported the idea of developing B.S. Biology concentrations/tracks. The Biology program developed two additional concentrations/tracks which have provided students with more guidance when pursuing a particular career path. The Cellular, Molecular, and Developmental Biology track (CMDB) requires: Calculus, Organic Chemistry, Physics, and Cellular Biology so that students interested in pre-med or graduate school will have the prerequisites necessary to apply. The Ecology, Evolution, and Organismal Biology track is designed for students interested in jobs with agencies like BLM, Forest Service, Colorado Parks and Wildlife, or U.S. Fish and Wildlife. All four B.S. concentrations contain certain common core courses: BIOL 105/105L Attributes of Living Systems, BIOL 208L Fundamentals of Ecology and Evolution, BIOL 301/301L Genetics, and the capstone BIOL 483 Senior Thesis. This sequence of core courses across all the B.S. degree tracks is used for program assessment. An assessment plan has continued to be developed, and a final piece of assessment of the capstone course BIOL 483 was completed this fall.

The reviewer was both impressed and skeptical of the large number of course offerings listed in the CMU Biology section of the catalogue. The reviewer felt that the current number of T/TT faculty could not cover the scope of course offerings. He noted that students found it difficult to determine when many of the courses would be offered next. The department has addressed this with advising, course culling, and the development of a two-year course planning schedule.

The addition of tracks with required courses has resulted in scheduling changes. To assist students with course selection, a campus-wide two-year planning calendar is available on the website. On the whole, the department tries to adhere to the schedule but unexpected changes have occurred due to faculty departures. The Biology faculty advisors play an important role in course scheduling if students choose to meet with their advisors. Other tools that are available to guide students are program sheets and DegreeWorks. Biology students are also placed with advisors who match their interests. The department has faculty designated as pre-medical advisors and advisors for individual tracks. The student clubs with Biology faculty advisors also

play a major role in advising. The Graduate Education & Medical Sciences (GEMS) club provides information on how to apply to graduate programs, which courses to take, and where you can take the MCAT and introduces students to local healthcare professionals. The Fish and Wildlife club members meet with local agency professionals, participate in fieldwork, and receive information about employment opportunities.

The department has an extensive list of course offerings. As a group the faculty have voted to;

- add pre-requisites to courses to assist students with course sequence
- cull courses that are no longer relevant or that our current faculty cannot effectively teach.

Curriculum issues are addressed at department meetings. Our department meetings are held on a regular basis, and curriculum issues are discussed and voted on. With the recent departure of four T/TT faculty, the list of courses needs to be re-evaluated again. In our hiring process we look for individuals to cover certain courses, but the new hire's expertise is often different from that of the person who is being replaced. CMU has begun using a software program, Course Inventory Management (CIM), to facilitate curriculum changes. This software should make it possible to inactivate courses in a timely manner so that students know which courses are likely or unlikely to be offered. Since this curriculum software is web-based, deactivated courses can be temporarily removed from the Biology course list, resulting in less student confusion about course offerings.

Finally, at the last department review the B.S. Secondary Education had failed to meet the Specialty Professional Association (SPA) requirements for national recognition by the National Council for the Accreditation of Teacher Education (NCATE). This accrediting body no longer exists. Several changes occurred due to comments from the 2013-14 reviewer. The Center for Teacher Education uses a new accreditation body since NCATE disbanded. The CMU Center for Teacher Education is currently accredited by Colorado Department of Education (CDE) and Colorado Department of Higher Education (CDHE). Letters confirming accreditation are in Appendix B. For the national lens the Center for Teacher Education relies on the Praxis II science content exam and the Teacher Performance Assessment (edTPA) which utilizes a portfolio assessment for teaching. These data are also found in Appendix B. Another change that occurred was the addition of BIOL 385 Nature and Philosophy of Science to the required Secondary Education curriculum. This course was added to address a SPA standard that not met in their report. BIOL 385 content addresses topics such as distinguishing science from non-science, evolution and practice of science, analysis of assertions made in science, and philosophical tenets, all topics that strengthened the program. This course is also an upper-division elective for the other B.S. tracks in the Biology program.

D. Program Centrality to CMU's Role and Mission

Institutional Mission Statement:

Committed to a personal approach, Colorado Mesa University is a dynamic learning environment that offers abundant opportunities for students and the larger community to grow intellectually, professionally, and personally. By celebrating exceptional teaching, academic excellence,

scholarly and creative activities, and by encouraging diversity, critical thinking, and social responsibility, CMU advances the common good of Colorado and beyond.

Institutional Statutory Role and Mission:

The role and mission of the institution were reenacted in 2010 by the Colorado General Assembly (Colorado Revised Statutes 23-53-101) and amended in 2011 when Mesa State College was renamed Colorado Mesa University:

There is hereby established a university at Grand Junction, to be known as Colorado Mesa University, which shall be a general baccalaureate and graduate institution with selective admission standards. Colorado Mesa University shall offer liberal arts and sciences, professional, and technical degree programs and a limited number of graduate programs. Colorado Mesa University shall also maintain a community college role and mission, including career and technical education programs. Colorado Mesa University shall receive resident credit for two-year course offerings in its commission-approved service area. Colorado Mesa University shall also serve as a regional education provider.

The Biology program fits in very well with the role and mission of Colorado Mesa University. Our program serves students in the region, from other locations in the state, and from outside the state.

E. Program Support for Other Majors

The Biology program provides coursework for a wide variety of other majors in a number of capacities. The Biology program has four courses listed as both CMU Essential Learning and GT Pathways Natural Sciences with Lab. The State of Colorado established a list of general education courses that qualify in GT Pathways as guaranteed transfer courses. These courses transfer between in-state institutions of higher education. Courses must be submitted with justification to be approved as GT Pathways eligible. The courses are used primarily by non-majors to fulfill the seven-credit requirement for general education/essential learning.

The Biology courses that can be used within the Natural Science essential learning category include

- BIOL 101/101L General Human Biology–GTSC1
- BIOL 105/105L Attributes of Living Systems–GTSC1
- BIOL 108/108L Diversity of Organisms–GTSC1 (replaced BIOL 102/102L)
- BIOL 250/250L Introduction to Microbiology–GTSC1

BIOL 101/101L is our most popular non-major essential learning course. It is geared toward the non-science major. This course has labs that run back to back Monday thru Friday, and the lecture sections average 75-94 students. Recently, BIOL 250/250L Introduction to Microbiology was added to the essential learning selection of courses, allowing pre-nursing students to take a course essential to their career choice. This course is a requirement of the B.S. Nursing degree. BIOL 105/105L and BIOL 108/108L are listed in essential learning but are more appropriate for science majors in other disciplines.

In 2015, CMU implemented a new essential learning capstone as a lower-division requirement for all CMU graduates. The capstone is a combination of an interdisciplinary ESSL 290 Maverick Milestone topic (3 credits) combined with an ESSL 200 Essential Speech (1 credit). The Biology department has contributed at a minimum one faculty member every semester to teach a Maverick Milestone.

The number of students enrolled and Student Credit Hours (SCH) in Biology essential learning courses have increased over five years (Appendix A Departmental Data):

2014-15 students enrolled=2,801 vs 2018-19 students enrolled =3,049
2014-15 SCH=5,634 vs 2018-19 SCH=6,144

The Biology department provides support courses for a variety of programs at CMU. These programs include Health Sciences, Kinesiology, Forensic Sciences, and Biochemistry.

In the Health Sciences department, all of the nursing degrees as well as the Bachelors of Applied Science in Radiologic Technology require BIOL 209/209L and 210/210L Human Anatomy and Physiology I and II, as well as BIOL 241 Pathophysiology. The Biology department developed BIOL 250/250L Introduction to Microbiology as an essential learning natural science with lab course. The Health Sciences department lists this as a required pre-requisite for their B.S. Nursing program.

The Department of Kinesiology offers both B.A. and B.S. concentrations that require BIOL 209/209L, the first semester of Human Anatomy and Physiology I. Students in the concentrations can also elect to take BIOL 210/210L Human Anatomy and Physiology II, BIOL 341/341L General Physiology, and BIOL 409/409L Gross and Developmental Human Anatomy (human cadaver lab course).

The Chemistry program added a Biochemistry concentration. This concentration relies heavily on multiple biology courses to fulfill the degree requirements. Required foundation courses include BIOL 105/105L Attributes of Living Systems, BIOL 301/301L Principles of Genetics, BIOL 302 Cellular Biology, and BIOL 371L Laboratory Investigations in Cellular and Molecular Biology. This is a total of 14 credit hours, with 5 of those credits in the laboratory.

Students can also minor in Biology, Forensic Science, or Forensic Anthropology. These students will take both foundational and upper-division Biology courses. The Forensic Anthropology minor requires BIOL 209/209L Human Anatomy and Physiology I and BIOL 410/410L Human Osteology. Other electives offered specifically for Forensic Science minors include BIOL 217/217L Forensic Entomology and BIOL 344/344L Forensic Molecular Biology.

The Biology department faculty service a large number of non-majors. This is evident when comparing Student Credit Hours by major over the last four years (Appendix A Departmental Data).

Total SCH of non-majors: 2015-16 SCH =11,282 vs 2018-19 SCH=12,098

Over a four-year period, Biology faculty have taught an additional 812 SCH. This increase has been achieved primarily by increasing lecture course caps and filling laboratory sections to capacity.

F. Locational Advantage

Colorado Mesa University is the regional education provider of higher education in western Colorado. CMU provides students from the local area access to an education, but our location is also drawing students from eastern Colorado and out of state. The Grand Junction area offers a small city atmosphere with access to outdoor opportunities. The Biology department takes advantage of the proximity of outdoor resources and utilizes the surrounding area for field trips as a part of non-major and major courses. The Grand Junction area is also an excellent location for ecological research, with much of the public lands controlled by the Bureau of Land Management, National Park Service, or Colorado Parks and Wildlife.

G. Unique Characteristics

For an institution of our size, our commitment to support undergraduate research is unique. The Biology department has collaborated with campus departments and local entities to expand undergraduate research and provide our students with unique experiences. The Biology department has dedicated research space for faculty with undergraduate students on the third floor of Wubben Science. The CMU Department of Biological Sciences is partnered with the Saccomanno Higher Education Foundation to provide research internships. The Saccomanno Program in Biological Research is part of St. Mary's Hospital in Grand Junction. The program is nearly ten years old and has provided 5-6 students every summer with the opportunity to complete a 10-week paid research project under a faculty member's mentorship. Students then present their research in a public forum. This program has expanded to support undergraduate research during the academic year. St. Mary's has also donated a significant amount of cellular and molecular equipment to the Biology department to support the expansion of research.

CMU is unique in that it has a Forensic Investigation Research Station (FIRS), i.e. body farm. Forensic science is offered only as a minor. The Forensic Science minor is administered by the department of Biology, and the Forensic Anthropology minor is administered by the department of Social and Behavioral Sciences. The CMU body farm is used for the study of taphonomy to determine post-mortem intervals and happenings in the body after death in a high desert environment. The Biology department offers courses for both forensic minors, and many Biology students have had the opportunity to participate in taphonomy studies at the facility. Several Biology faculty members have participated in collaborative research at the facility. Eriek Hansen, Associate Professor of Biology, and Melissa Connor, Associate Professor of Forensic Anthropology and Director of the FIRS, completed a grant from the National Institute of Justice (three years, 258,659.50).

II. CURRICULUM

II. CURRICULUM

A. Program Curriculum

The Biology program did a significant reorganization of curriculum during the development of the two additional Biology concentrations. Much of the curriculum remained intact to provide a diverse selection of course work suited to prepare students for the diversity of career opportunities afforded by a B.S. Biology degree. Students in the Biology concentration take core courses and then choose from three of four categories: Category 1, cellular, developmental and molecular; Category 2, organismal; Category 3, anatomical and physiological; and Category 4, ecology, evolution, and systematics. Students end up with a broad education but are able to choose between electives to focus the degree toward their interests.

The program developed two new tracks which specifically mandate courses necessary for the pursuit of certain career goals. These tracks were first offered in 2015-16. The Cellular, Molecular, and Developmental Biology (CMDDB) concentration was designed for students interested in furthering their education in graduate programs (pre-med, Masters & Ph.D.). The track requires more advanced levels of math and chemistry compared to the B.S. Biology concentration. This track also aligns required courses with the pre-requisite requirements for applying to medical school. The Ecology, Evolution, and Organismal (EEOB) concentration also prescribes a greater number of required courses and reduces the number of elective options. This track was designed to facilitate course selection for students who are interested in working with federal and state agencies such as Bureau of Land Management, Forest Service, National Park Service, or Colorado Parks and Wildlife. Each of the new tracks requires students to take certain prescribed courses and reduces the number of elective options. The tracks have altered course schedules, with some courses now being offered more frequently. The demand for courses required in the CMDDB track has significantly increased, since the number of majors in this track has nearly doubled every year since it was introduced. The number of majors in CMDDB concentration:

2015-16 = 39 vs 2018-19 = 162 majors

Additional changes to curricula have resulted with the introduction of tracks. The CMDDB track has a two-semester sequence of freshman-level general Biology (BIOL 105/105L and BIOL 108/108L). These courses are an introductory cell and a combined plant/animal course sequence. The B.S. Biology and EEOB require a three-semester sequence with a full-year combination of BIOL 107/107L Plant Biology and BIOL 106/106L Animal Biology. A set of core courses still exists between the tracks in the freshman, sophomore, junior, and senior years. All tracks are required to take BIOL 105/105L Attributes of Living Systems, BIOL 208/208L Fundamentals of Ecology and Evolution, BIOL 301/301L Principles of Genetics, and BIOL 483 Senior Thesis. Secondary Teacher Education is the exception since this a science- rather than Biology-based concentration. This major requires BIOL 105 and BIOL 483 so that a freshman-level and a senior-level course can be used for assessment.

We also have a degree in secondary teaching. The program has undergone several curricular changes as state requirements have changed. An unusual aspect of licensure in Colorado is that, although students are receiving a Bachelor's degree with Biological Sciences as their content

area, the State of Colorado licenses in Science rather than in Biology. As a consequence of science licensure, students must be proficient in Biology, Chemistry, Physics, and earth sciences. Therefore, the degree is somewhat weak in Biology but does give students the skills necessary to pass their Praxis II science content licensure exams, as evidenced by the 90% pass rate from 2014 to 2019. (12 students completed the exam, two have not gotten scores back, ten passed and one failed.) Changes effective Fall 2013 include adding BIOL 483 Senior Thesis to these students' curriculum to give them a common capstone with all the B.S. Biology concentrations. A new course, BIOL 385 Nature and Philosophy of Science, was added in order to strengthen the degree. The program is accredited by CDE and CDHE.

There are also two minors, a minor in Biology and a minor in Forensic Sciences, as well as an Associate of Science degree (Liberal Arts) with an emphasis in Biology.

B. Program Currency

The Biology program developed concentrations that provide students who major in these tracks a pathway to graduate programs or specific career goals. Our B.S. Biology provides majors with a broad base of core courses. The B.S. Biology major has a core of BIOL 105/105L Attributes of Living Systems, BIOL 106/106L Principles of Animal Biology, BIOL 107/107L Principles of Plant Biology, BIOL 208/208L Ecology and Evolution, BIOL 301/301 L Principles of Genetics, and BIOL 483 Senior Thesis. These courses provide broad coverage of the basics in the field of Biology. The requirement of 20 credit hours in Additional Biology courses stipulates that the courses have to be a combination of three out of the four course categories: Category 1: Cellular, Developmental, and Molecular; Category 2: Organismal; Category 3: Anatomical and Physiological; and Category 4: Ecology, Evolution, and Systematics. The major also has students take one of the following courses as part of the Additional Biology: BIOL 302 Cellular Biology, BIOL 341/341L General Physiology and lab, or BIOL 421/421L Plant Physiology and lab. This concentration is for Biology students who want a broader understanding of the Biological sciences. Students can tailor their course selections to a wide variety of career choices.

The B.S. in Cellular, Molecular, and Developmental Biology (CMDB) contains a course sequence that meets the requirements of students who wish to apply to graduate programs. It starts with a more traditional freshman two-semester course sequence of General Biology, BIOL 105/105L Attributes of Living Systems and BIOL 108/108L Diversity of Organisms. The other core courses are also included: BIOL 208/208L Ecology and Evolution, BIOL 301/301L Principles of Genetics, and BIOL 483 Senior Thesis. This degree has additional requirements which include MATH 151 Calculus, CHEM 131/131L/132/132L General Chemistry I & II, CHEM 311/311L/3312/312L Organic chemistry, CHEM 315/315L Biochemistry, BIOL 302 Cellular Biology, and BIOL 310/310L Developmental Biology. The course requirements for this degree contain the pre-requisites necessary to apply to medical schools or other graduate programs.

The other concentration addition is the B.S. in Ecology, Evolution, and Organismal Biology (EEOB). The core courses mirror the B.S. Biology. These include: BIOL 105/105L Attributes of Living Systems, BIOL 106/106L Principles of Animal Biology, BIOL 107/107L Principles of Plant Biology, BIOL 208/208L Ecology and Evolution, BIOL 301/301L Principles of Genetics,

and BIOL 483 Senior Thesis. This provides students with a broad range of coverage in the field of Biology. The concentration distinguishes itself by requiring BIOL 403 Evolution and BIOL 405/405L Advanced Ecological Methods. Students also are not required to choose courses from three out of four Additional Biology categories. Students can choose 20 credits from any category, allowing students to take more Organismal, Ecology, or Systematics courses. This degree is designed for students who would like to work for wildlife and land management agencies. Most of these agencies want applicants to have fisheries training, so as part of our hiring the department added a fisheries biologist. Our fisheries biologist has reorganized courses and will be adding a Fish Management course to the curriculum.

For the Biology, Secondary Education concentration, the degree is designed very specifically to meet licensure requirements to teach science in Colorado. The program does a very good job of preparing students to teach in small rural districts in Colorado where they may be the only science teacher and therefore may be teaching chemistry, physics and earth science in addition to biology. Our students are very successful at passing the Praxis II science licensure exam, and several students have received an excellent score at the national level. We have strengthened the program in recent years by creating a new course, BIOL 385 Nature and Philosophy of Science, to address topics especially relevant to educators and have added a capstone, BIOL 483 Senior Thesis, to provide these students with the opportunity to gather and integrate information related to specific biological topic into an in-depth thesis.

Most of the curriculum changes since the last review have been part of the program concentration additions. Courses were identified as being essential to the curriculum of the different tracks. Some courses have been modified to better reflect content. BIOL 414/414L Freshwater Ecology was formerly Aquatic Biology, which was deemed to be too broad a coverage for an upper-division course. The department has also culled courses that are no longer relevant to our curriculum.

The Biology program has added one graduate-level course. BIOL 500/500L Advanced Human Anatomy is taught as part of the Physician Assistant program. The PA program was given provisional accredited in Fall 2018, before the first cohort began the program in January 2019. The Biology department has been offering BIOL 409/409L Gross and Developmental Human Anatomy since the Fall of 2011. This Human cadaver course is beneficial to our pre-med Biology students and nursing majors and is one of the electives that can be taken for the Kinesiology department's B.S. in Exercise Science. The Biology department faculty added BIOL 500/500L as part of our cadaver lab curriculum. Biology converted a classroom into a dedicated human cadaver laboratory. The laboratory has been modified to increase air exchange, and sinks were added. This space is not ideal, and a new cadaver laboratory is included in the plans for a Physician Assistant building. State funding had been approved to build a new facility to house the Physician Assistant, Physical Therapy, and Occupational Therapy programs, but it was pulled this last summer. Once the facility is built, all human cadaver courses will utilize the new laboratory. Planning meetings with the architects have already taken place.

The Biology program has added courses which support minors offered at CMU. Besides BIOL 344/344L Forensics Molecular Biology, the program added BIOL 217/217L Forensic Entomology and BIOL 410/410L Human Osteology to the curriculum in 2013. These courses

support the Forensic Science and Forensic Anthropology minors. While the number of minors is small, these minors are unique to our programs since CMU has a body farm. The Forensic Investigation Research Station (FIRS) offers Biology, Criminal Justice, and Anthropology majors the opportunity to pursue forensic careers. Grand Junction also has a Colorado Bureau of Investigation (CBI) field station that offers a competitive internship to CMU students. This internship has resulted in permanent positions for some of our Biology graduates.

The addition of concentrations has helped both faculty and our students to navigate course selection and has improved advising. Students are assigned advisors who share similar interests in the Biological sciences. Faculty who teach primarily organismal and ecology courses are assigned advisees in the Ecology, Evolution, and Organismal Biology (EEOB) track. Both the EEOB, CMDB, and Secondary Teacher Education tracks have a course sequencing that is scripted. These students follow a Fall/Spring sequence of courses that is laid out clearly in the program sheet. Students in the B.S. Biology still have significant flexibility within the Additional Biology courses selection but have to choose courses in three out of four categories to obtain a broad-based Biological sciences education. For these students, the flexibility can be valuable in tailoring a program curriculum best suited to the students' individual career goals, but students who fail to meet regularly with their advisors may not take the most suitable selection of course work. Designing the four concentrations with a common core but scripting certain course requirements for each concentration has reduced the confusion of course selection.

A Biology degree will continue to facilitate careers in a wide variety of areas, and it has future growth potential. According to the Economic Development and Employer Planning System (EDEPS) projections (<http://edepts.org>), employment trends indicate a need for employees with a biological background. Projections to the year 2026 suggest that jobs for biological scientists are expected to grow by 8%, for biological technicians by 17.7%, for medical scientists by 13.4%, for zoology and wildlife biologists by 7.7%, and for microbiologists by 8.2%. The need for middle school science teachers is also expected to grow by 15.1% by 2026 (EDEPS data attached).

SOC Code	Occupation	Growth Rate 2016-26	Median Annual Wage	Typical Education	Work Experience	Typical Training	Pct Self Empl
19-1021	Biochemists and Biophysicists	Faster than the average	\$93,280	Doctoral or professional degree	None	None	3.1%
25-1042	Biological Science Teachers, Postsecondary	Much faster than the average	\$82,550	Doctoral or professional degree	None	None	0.3%
19-1029	Biological Scientists, All Other	As fast as the average	\$79,590	Bachelor's degree	None	None	1.3%
19-1099	Life Scientists, All Other	As fast as the average	\$78,190	Bachelor's degree	None	None	1.5%
19-1022	Microbiologists	As fast as the average	\$71,650	Bachelor's degree	None	None	2.5%
19-1023	Zoologists and Wildlife Biologists	As fast as the average	\$63,420	Bachelor's degree	None	None	0.9%

• Long-term OJT (on-the-job training): more than 1 year • Moderate-term OJT: 1-12 months • Short-term OJT: 1 month or less

Occupational Projections		Employment		Change 2016-26		Average
SOC Code	Occupation	Base 2016	Proj 2026	Number	Percent	Annual Openings
19-1021	Biochemists and Biophysicists	31,500	35,100	3,600	11.4%	3,200
25-1042	Biological Science Teachers, Postsecondary	62,300	71,700	9,400	15.1%	6,000
19-1029	Biological Scientists, All Other	38,700	41,800	3,100	8.0%	3,700
19-1099	Life Scientists, All Other	8,900	9,700	800	9.0%	800
19-1022	Microbiologists	23,200	25,100	1,900	8.2%	2,200
19-1023	Zoologists and Wildlife Biologists	19,400	20,900	1,500	7.7%	1,900

C. Program Delivery

Biology courses are offered online or on-site at the main campus, the Montrose campus, and at a limited number of high schools in the area as part of the Early Scholars program. The vast majority of the courses are site-based and located on the main campus. The courses offered online or at sites other than the main campus are primarily Essential Learning and pre-requisite courses for the Health Sciences department. These courses are BIOL 101/101L General Human Biology, BIOL 209/209L and 210/210L Human Anatomy and Physiology I and II, and BIOL 241 Pathophysiology. While the Montrose campus offers all the courses listed above each semester, they teach only one lecture/laboratory section with enrollments limited to 24 students. The majority of instruction at the Montrose campus is by part-time lecturers with one full-time instructor who is shared with the main campus.

The Early Scholars program has shrunk in the last few years due to the state mandating faculty qualifications that at a minimum require 18 credit hours of discipline content at the graduate level to teach within a discipline. Many of the Early Scholars high school instructors had Masters' outside of the Biology discipline and are no longer able to offer college credit level coursework.

III.

ANALYSIS OF STUDENT DEMAND AND SUCCESS

III. ANALYSIS OF STUDENT DEMAND AND SUCCESS

A. Number of Majors

The number of B.S. Biology majors in 2014-15 was 555. The number in 2018-19 is 563. While there has been an increase, the multiples years in-between had even greater numbers of majors. The total number of majors is divided between B.S students in Biology; Cellular, Molecular, and Developmental Biology (CMDB); Ecology, Evolution, and Organismal Biology (EEOB); and Secondary Teaching. The CMDB concentration was introduced in 2015-16; it has nearly doubled its number of majors each year. Currently, 162 students are majoring in the CMDB track. The EEOB concentration has consistently had fewer majors but has grown by nearly 20 majors annually. Currently, 80 students are majoring in the EEOB track. The B.S. Biology has the greatest number of majors. It currently has 286 majors.

For Teacher Education, the number of majors had held steady at about 20 majors, but this year the number has declined to 14 students. This decline in the number of students entering the teaching profession is a national trend.

The number of A.S. Biology students has declined. In 2014-15 the department had 99 students, while in 2018-19 the number dropped to 56 students pursuing an A.S. in Biology. In the past, students often transferred from CMU to other institutions to complete their education, so faculty advised students to get their A.S. prior to transferring. With the articulation and transfer agreements established between Colorado institutions of higher education, it is no longer as necessary to advise students to get an A.S. prior to transferring within the state. This decline in A.S. Biology numbers has affected our total number of majors, resulting in an overall decline in Biological Science majors.

While the number of students pursuing an A.S has declined, the department has seen an increase in B.S. majors. This is due to fewer students transferring out, an increase in students transferring in, and greater retention of Biology students to graduation.

The number of students enrolled with a minor in Biology has increased from 18 to our current 32 students between 2014-15 and 2018-19. The number of students in the Forensic Science minor is at 16 students, which is a relatively stable number of students.

B. Registrations and Student Credit Hours by Student Level (data in Appendix A)

In 2014-15, Biology had 7,397 students enrolled in courses and a student credit hour (SCH) total of 15,890. In the next three years, enrollment and SCH increased but have since dropped slightly. In 2018-19, the number of students enrolled was 7,910 with 17,138 SCH. This is an increase of 513 students and 1,248 SCH. To handle the increased SCH, the department has offered more laboratory sections. In 2014-15, the department offered 143 lab sections and increased the lab sections to 158 in 2018-19. While the department added lab sections during that time period, the number of lecture sections increase by only two. The department has added additional sections of laboratories by increasing the lecture caps. This has allowed the program's student enrollment to grow with a minimal addition of full-time faculty. While this has increased

our departmental efficiency, it has impacted class size, and it is limited by classroom availability and laboratory capacities. Most of our large lecture section courses are capped at 75-94 students, and the largest classroom on campus is limited to 110 students. At this point, lecture course enrollment caps cannot continue to increase, and additional faculty will need to be hired in order to increase both lecture and laboratory student enrollment.

While total student credit hours have increased, some variation is evident at the student levels. Broken down by student level in three of the years, AY2014-15, AY2016-17 and AY2018-19, the numbers are

BIOL & ESSL SCH	AY2014-15 SCH	AY2016-17 SCH	AY2018-19 SCH
Freshman	2669	2677	2351
Sophomore	5988	6259 + 72=6331	6016 + 3=6019
Junior	2936	3223 + 141=3364	3660 + 75=3735
Senior	4176	4798 + 48=4846	4828 + 18=4846
Non-degree	121	109	122
Graduate			65
Total	15,890	17,327	17,138

While the number of freshman SCH has not increased between AY2014-15 and AY2018-19, all other student levels of SCH did increase. The most significant increases in SCH are in the Junior and Senior (JR/SR) level. From AY2014-15 (7112 SCH) to AY2018-19 (8,581 SCH), the Biology faculty taught an additional 1,469 SCH to junior and senior level students. This shift in SCH at the JR/SR student level may be partially due to an increase in the annual number of B.S. majors who graduated between AY2015-16 and AY2017-18. During those years, 75-80 students graduated from the Biology program, the largest graduating classes ever. The number of students enrolled at the JR/SR levels during AY2016-17, AY2017-18, and AY2018-19 is close to the number enrolled at the freshmen and sophomore (FR/SO) level. In AY2017-18, the number of enrolled FR/SO was 4,031, and the number of enrolled JR/SR was 4,027. The successful retention of Biology students closer to graduation boosted SCH at the JR/SR level.

The freshman level SCH and student enrollment did vary between AY2014-15 and AY2018-19. Freshman enrollment numbers did decline in this time period, but overall SCH continued to increase due to retention and student transfers into the institution. The flattened freshman enrollment was reversed this fall, with CMU registering a greater number of incoming freshmen compared to previous years.

C. Registrations and Student Credit Hours by Course Level

The student credit hours have increased overall between AY2014-15 and AY2018-19, from 15,890 to 17,138. The overall pattern varies by course. One notable increase in SCH is seen in lower-division courses (100/200 level). Lower-division SCH increased from AY2014-15 to AY2018-19 from 12,668 SCH to 13,859 SCH. The majority of the increase is due to essential learning, milestones (ESSL), and non-major course offerings for the Health Sciences and Kinesiology departments. The number of non-majors enrolled and non-major SCH both

increased between AY2014-5 and AY2018-19. The total non-major SCH increased from 11,282 to 12,098 = 816 SCH.

Other course-level increases have been due to the addition of the Biology concentrations and the development of a B.S. in Biochemistry. The B.S. in Biochemistry requires 14 credits of coursework within the Biology curriculum. Upper-division courses required for the new Biology concentrations and Biochemistry are required to be offered more frequently to assure that students can graduate in four years if they follow the program's recommended course sequence.

The following is a list of some upper-division courses that have increased demand:

BIOL 301/301L Principles of Genetics	3/1cr	2014-15 SCH =483 vs 2018-19 SCH=684
BIOL 302 Cellular Biology	3cr	2014-15 SCH=123 vs 2018-19 SCH=198
BIOL 310/310L Developmental Biology	3/2cr	2015-16 SCH=95 vs 2018-19 SCH=235
BIOL 371L Invest Cell & Molecular lab	3cr	2015-16 SCH=42 vs 2018-19 SCH=78

D. Number of Graduates

Within the last five years, the total number of annual B.S. graduates has varied between 51 and 80 students annually. The total number of B.S degrees awarded in the last five years is 336.

In 2018-19, the department graduated 34 students with a B.S. Biology, 12 students with a B.S. Cellular, Molecular, and Developmental Biology, 5 students with a B.S. Ecology, Evolution, and Organismal Biology, and 0 students in Secondary Education. The number of students graduating in Secondary Education over the last five years has dropped from previous years. In total, only eight students have earned a B.S. Secondary Education degree over the last five years. Despite the demand for secondary education teachers, fewer students are deciding to pursue a teaching career.

In the last five years, the department graduated 36 students with an A.S. in Biology, and 37 students completed a minor in Biology or Forensic Science.

This year the department expects to graduate 80 or more students, since the Fall 2019 winter graduation list contains 39 on-track students and the Spring 2020 class of graduating seniors is usually larger than the winter graduation class.

E. Student Successes

Students and graduates of the Biology program have been successful in getting accepted to post-baccalaureate programs and obtaining jobs that are aligned with the education they have received at CMU in addition to REUs both here at CMU and nationwide. They have presented their research in numerous research conferences nationwide and even published in peer-reviewed journals.

Peer-Reviewed Publications

Name	Year	Citation
Sophia Reck	2018	Hansen, E. S., C. Baigent, S. I. Reck, and M. Connor. 2018. Bioelectrical impedance as a technique for estimating postmortem interval. <i>Journal of Forensic Sciences</i> 62(4): 1186-1190.
Brooklyn Waterhouse	2019	Camp MG, Shipley L, <i>Waterhouse BD*</i> , Varner J. (in press). Activity patterns and foraging behavior of American pikas (<i>Ochotona princeps</i>) differs between Craters of the Moon and alpine talus in Idaho. <i>Western North American Naturalist</i> .

Conference Oral Presentations

Student name(s)	Year	Presentation title	Conference title and location
Amanda Stahlke, Austin Hadley	2014	Zeynep Ozsoy, Amanda Stahlke and Austin Hadley Molecular Identification of the <i>Comatus</i> Species Found in Western United States	Riparian Restoration In the Western U.S. Tamarisk Coalition's Research and Management Conference, Grand Junction, CO
Ashley Pennington, Kelsi Arrieta, Rachel McLaughlin	2016	Zeynep Ozsoy, Ashley Pennington, Kelsi Arrieta, and Rachel McLaughlin Updates on the Identification of the Origins of <i>Coniatus</i> spp., A non-Native Weevil in Western North America.	The Road to Riparian Restoration Tamarisk Coalition Conference, Grand Junction, CO.

Conference Poster Presentations

Student name	Year	Presentation title	Conference title and location
Amanda Stahlke	2014	Preliminary Studies on <i>Comatus</i> (spp.), A Natural Enemy of Tamarisk (spp) Recently Found in Colorado	Riparian Restoration In the Western U.S. Tamarisk Coalition's Research and Management Conference, Grand Junction, CO
Kristine Crippen	2015	Crippen, K. C. and E. S. Hansen. Quantifying proximate body composition of Catostomids using bioelectrical impedance analysis.	Joint Meeting of Ichthyologists and Herpetologists, Reno, NV.
Sophia Reck	2017	Hansen, E. S., S. I. Reck, and M. A. Connor. Correlation of bioelectric impedance metrics to accumulated degree-days among body segments using gel pad electrodes.	American Academy of Forensic Sciences, 69th Annual Scientific Meeting, New Orleans, LA
Brooklyn Waterhouse	2017	Waterhouse BD*, Vaca JF, Varner J. Baseline camera-trap study in the Amazonian Yasuni Biosphere Reserve.	American Society of Mammalogists 2017. Moscow, ID.
Kristina Morben	2017	Morben, K., and E. S. Hansen. Quantifying proximate body composition in Catostomids using bioelectrical impedance analysis.	Crossing Borders – Crossing Barriers. Joint Meeting of Utah and Colorado/Wyoming Chapters of the American Fisheries Society, Grand Junction, CO.
Brooklyn Waterhouse	2019	Waterhouse BD*, Camp M, Shipley LA, Varner J. Activity Patterns of Pikas in an Atypical, Low-Elevation Lava Habitat. * = mentored CMU student	American Society of Mammalogists, 2019. Washington, DC.
Brooklyn Waterhouse & Tabitha McFarland	2019	McFarland T*, Waterhouse BD*, Varner J. Seasonal patterns of stress hormone metabolites in pika latrines. * = mentored CMU student	American Society of Mammalogists, 2019. Washington, DC.

Several of our students have entered post-baccalaureate programs in medical fields:

PA Programs:

- Amy Knackendoffel - Master of Physician Assistant Studies Rocky Vista University
- Amber Gillard – Physician’s Assistant Program at CMU
- McCall Chapman – Physician’s Assistant Program at CMU
- Bailey Buhr - Physician’s Assistant program at Anschutz Medical Campus (Colorado)
- Tiffany Peterson - Physician’s Assistant program at CMU
- Tylen Pavlovsky - Physician’s Assistant program at Creighton University School of Medicine (Nebraska)
- Meg Margeson – PA degree earned – Pacific University
- Katharyn Woodard – PA degree earned – University of North Texas Health Science Center at Fort Worth

DO and MD Programs:

- Molly Kubesh – MD/PhD program – Creighton University
- Michael Samuelson - Idaho College of Osteopathic Medicine
- Erik Heine - AT Still University School of Osteopathic Medicine (Missouri)
- Rachel Stapp - Ross University School of Medicine (Barbados)
- Justin Blaskowski – D.O. School at Western University of Health Sciences COMP-Northwest in Lebanon, OR
- Kaydie Murphy - Liberty University College of Osteopathic Medicine (Virginia)
- Krystie Murphy - Liberty University College of Osteopathic Medicine (Virginia)
- Johnathon Olivas - Rocky Vista University College of Osteopathic Medicine (Colorado)
- Rachel Baldwin - Rocky Vista University College of Osteopathic Medicine (Colorado)
- Peter Szekely - University of Szeged Albert Szent-Györgyi Medical School (Hungary)
- Michael Samuelson - Idaho College of Osteopathic Medicine (Idaho)

Others:

- Charles Blakeley Alexander - University of Colorado School of Dental Medicine
- Wyatt Colloty – Master of Science Modern Human Anatomy University of Colorado Anschutz Medical Campus
- Megan Gromke - Masters Program in Biomedical Sciences Bluefield College
- Auburn Palmisano: Doctor of Physical Therapy Regis University (Colorado)

A sampling of our students who have entered graduate programs:

- Taylor Richardson – Graduate School, Miami University
- Olivia Sayer – PhD program – University of Wisconsin-Madison
- Marisa Bickel – MS program – Northern Colorado Mesa University
- Zack Gardner – PhD program in Molecular Biology , Boston University
- Amanda Stahlke – PhD program in Bioinformatics and Computational Biology, University of Idaho
- Sophia Reck - MA Anthropology at LSU
- Cora Heister - Master's degree at University of Otago in New Zealand

Several graduates who have gotten jobs or internships in the areas of their interest:

- Justin McCoy, 2019 - Chahinkapa Zoo in Wahpeton, ND, Zookeeper Internship
- Jacob Eggers, 2018 - Colorado Parks and Wildlife, Fisheries Technician
- Tyler Walton, 2018 - US Fish and Wildlife Service, Fisheries Technician
- Brandy Worth, 2018 - Colorado Bureau of Investigation, Evidence Technician
- Lucas Laurita, 2018 - Colorado Parks and Wildlife, Fisheries Technician
- Stacy Norris, 2017 - Works for Singletrack Trails in Grand Junction (company that builds sustainable, shared use trails across the U.S.)
- Kristina Morben, 2017 - Idaho Department of Fish and Game, Fisheries Technician
- Chris Walker, 2017 - Works for Ruby Canyon Dental (will be applying to dental school)
- Ashley Pennington, 2017- Allergy and Immunology Specialist at United Allergy Services
- Robbin Bonner, 2016 - Fish Culturist at New Mexico Game and Fish
- Amanda Jones, 2016 - Owns her own nature illustration company, Flutter Illustrations
- Jennifer Thibodeau, 2016 - Works in production at Talon Winery
- Tiffany Rubalcaba, 2016 - Wildlife Biologist for the BLM in Kremmling
- Austin Hadley, 2015– Science/Social Studies teacher at Orchard Mesa Middle School
- Chandler Baldwin, 2014 – Science teacher at American Academy - Motesenbocker
- Kelsi Antonelli Blaskowsky, 2015 - Bureau of Land Management, Oregon & Washington
- Deseray Davis, 2015 - Medical Laboratory Technician at Longmont United Hospital (Colorado)
- Katharyn Woodard, 2014 – Physician Assistant at WellMed Medical Management, TX

Since 2014, over thirty CMU students have been accepted through a competitive application process and have participated in SIPBR (Saccomanno Internship Program in Biological Research) funded by the Saccomanno Higher Education Foundation either in the summer or the fall. These students have conducted research under the mentorship of a Biology faculty for ten weeks and presented their work at the symposium to the department and the community. In addition to SIPBR, several students have conducted REUs around the country.

IV.

ACADEMIC PROGRAM
RESOURCES

IV. ACADEMIC PROGRAM RESOURCES

A. Faculty

In Fall of 2006, the Biology program had twelve tenured or tenure-track faculty (T/TT), eight of whom were full professors; three full-time instructors; and three part-time lecturers (AY2006-07 total SCH=9,103). In Fall 2013, Biology had fourteen tenured or tenure-track faculty, with two faculty members in transitional retirement, four full-time instructors plus a split appointment instructor with the Physical and Environmental Sciences (PES) department, and seven part-time lecturers. Two of the "part-time" lecturers were teaching a full load of courses, and three of the part-time instructors only taught at the Montrose campus. (AY2013-14 SCH= 16094) In Fall 2018, the department had sixteen tenure/tenure-track faculty, one had moved to Administration and a replacement position had been approved, along with seven instructors and eight part-time lecturers. Two of our full-time instructors have split positions and only teach 4-6 credits on-site, another is an emergency hire, and another is designated as lab instructor only. Half of the eight part-time instructors teach online courses or on-site courses at the Montrose campus (AY2018-19=17,138). At each review cycle, the number of tenure/tenure-track faculty has increased along with SCH.

Faculty have a heavy teaching load of 12 hours of load credit each semester; they often teach different courses each semester as well as teaching courses that may be taught in alternate years. Lecture credit is based on the lecture credit hours. The laboratory credit is based on a laboratory load formula which is calculated using total lab hours and number of times the lab meets per week. For example, a 1-credit hour lab that meets once weekly for 3 hours = 2 hours of lab load credit.

In addition to teaching, tenure-track faculty as well as many of the instructor faculty are actively involved in service, advising, and scholarship activities. All members of the department are involved in both departmental and campus-wide committees, and many are active in professional societies and in the community. Faculty within the department tend to serve on multiple committees. The campus has administrative committees, ad-hoc committees, task forces, and Faculty Senate standing committees. Our department faculty also advise three student clubs: Biology club, Fish and Wildlife club, and Graduate Education and Medical Sciences club (GEMS).

The advising responsibilities have increased, with faculty involved in individual advising, graduation petitions, freshman registration sessions, early alert reporting, and advisee outreach. All of these require that faculty be able to navigate the software programs: DegreeWorks and CRM. Tenured and tenure-track faculty are assigned advisees based primarily on student interest in the faculty member's area of expertise and/or the track in which the student is enrolled. The average number of advisees per faculty member is 32 students. The assignment of advisees varies, with new faculty assigned 25 advisees while other faculty have 40 plus advisees since their areas of expertise are more aligned with student interests. One large segment of our majors is assigned to our designated pre-med advisor. The pre-med advisor advises 107 majors and the pre-med club (GEMS). As part of the annual evaluation, faculty are expected to participate in campus-wide registration, recruitment, and orientation sessions. In order to retain students, the campus has also implemented the Early Alert program. Faculty report on the progress of certain

students in their courses at two, four, and eight weeks. This information also goes to faculty advisors who can use CRM (advising software) to contact the students who are doing unsatisfactory work.

Research activities are often additional activities on top of the faculty teaching load.

There is a formula to assign load credit for research, but it is contingent on covering all the required courses each semester. Due to high course demand, recent faculty resignations, and faculty expertise in a core course, it is difficult to apply the teaching load reduction formula consistently to faculty. The load formula is 0.2 hours of load per student credit hour. Using this formula, if a faculty member has five research students in either BIOL 387 Structured Research or in BIOL 487 Advanced Research and all five students are enrolled for three research credit hours (both courses have variable credit from 1-3 credit hours), the faculty member could receive a three-hour load reduction. Because of the heavy teaching load, it is more typical for faculty members with research students to receive 1-2 credit hours toward their teaching load (if they have three or more students), but they do not receive load credit for one or two student research students. The majority of faculty only involve one to two students in undergraduate research and often do not get load reductions for that semester. Load reductions can be calculated over multiple semesters, resulting eventually in a 1-2 credit release from teaching. Undergraduate research is one of our strengths but is also a challenge because of the teaching load, resource acquisition challenges, and a lack of time.

1. Ratio of full-time equivalent students to full-time equivalent faculty (Appendix A)

The ratio of full-time equivalent students (FTES) to full-time equivalent faculty (FTEF) has increased for the last three Biology program reviews:

- AY2005, the total FTES was 282, and the FTES:FTEF ratio was 16.60
- AY2012, the FTES was 513.4, and the FTES:FTEF ratio was 21.6
- AY2018-19, the FTES was 571.3 and the FTES:FTEF ratio was 25.2

In the last five years, the FTES:FTEF has ranged from 22.8 to the current high of 25.2.

2. Course credit hours and student credit hours by faculty type (Appendix A)

The majority of the Biology Student Credit Hours (SCH) have been taught by tenured/tenure-track faculty since AY2015-16. Currently, 62% of SCH are taught by T/TT faculty and 26% by full-time instructors (FT NonTT). Part-time (PT) faculty had been teaching 25% of the SCH, but that percentage has drop to 12% of the SCH in the last year. About half of our part-time faculty are teaching at the Montrose campus and account for the majority of SCH taught on that campus. The department has seen a reduction in part-time SCH production due to a decline in high school faculty who are qualified to teach in the Early Scholars program. These high school faculty must have a masters in Biology or a minimum of 18 graduate-level course credits in Biology to teach courses that qualify for CMU credit.

The increase in T/TT and FT NonTT has reversed the trend seen at the last review when part-time faculty were teaching higher percentages of SCH each year. Changes in percentages have varied with reviews:

- AY2005, T/TT taught 5559 SCH or 67% of SCH & PT faculty taught 953 SCH or 12%
- AY2012, T/TT taught 7180 SCH or 47% of SCH & PT faculty taught 3146 SCH or 20%
- AY2019, T/TT taught 10,729 SCH or 62% & PT faculty taught 2041 SCH or 12%

With fewer part-time faculty contributing to SCH generation, the percent of SCH covered by full-time faculty has increased. The Biological Sciences total SCH generation peaked in both AY2016-17 and 2017-18. These peaks corresponded with our largest ever graduating classes: 81 students graduated both years. In AY2018-19, the program’s total SCH declined slightly, which was partially due to an unfilled faculty resignation and two faculty sabbatical leaves.

3. Faculty successes

The Biology faculty are excellent teachers, dedicated to preparing their students for success as well as contributing to the university in service and advising. In addition, many of the faculty excel in scholarship with a variety of peer-reviewed publications and grant awards. A list of notable accomplishments follows, but refer to the individual vitae for more complete information on Biology faculty.

Notable Faculty Accomplishments 2015-2019:

Awards

name	year	award details
Hansen, Eriek	2018	Robert Gaffney Achievement Award recipient 2018 for the presentation titled “Bioelectrical Impedance Analysis as a Technique for Estimating the Postmortem Interval (PMI) in Human Remains”. American Academy of Forensic Sciences, 69th Annual Scientific Meeting, New Orleans, LA. February 2017.
Hansen, Eriek	2015	Max Rollefson Award of Merit. Colorado-Wyoming Chapter, American Fisheries Society. February 2015.
Varner, Johanna	2018	AAAS Early Career Award for Public Engagement in Science. Selective and prestigious national award honoring diverse contributions to public engagement in science. Note: This is one of the highest honors available for public engagement in science & outreach.
Varner, Johanna	2019	AAAS IF/THEN Ambassador, AAAS & Lyda Hill Philanthropies. Prestigious national honor for female STEM professionals to serve as high profile role models in the media for young women in science. Attended summit and developed press kit in Oct. 2019.
Matlock, Stephanie	2013	Faculty Fellow with US Fish and Wildlife Faculty Fellowship Program for Region 10. Summer 2103.

Matlock, Stephanie	2018	Governor's Fellow for the Civico Governors' Fellowship Program 2018-19
Sherbenou, Megan	2019	HAPS Outstanding Presentation Award for presentation titled "Maria's marathon: Effectiveness of a scalable interrupted case study in the undergraduate classroom." Human Anatomy and Physiology Society Annual Conference, Portland, OR. May 2019.
McVean, Carrie	2018	Academic Management Institute AMI. Nominated by CMU administration to attend leadership conference for women in higher education 2018-19

Peer-Reviewed Publications

name	year	citation	doi
Ozsoy, Zeynep	2019	Stahlke A. R., Ozsoy A. Z., Bean D. W., Hohenlohe P. A. (2019). Mitochondrial Genome Sequences of <i>Diorhabda carinata</i> and <i>Diorhabda carinulata</i> , Two Beetle Species Introduced to North America for Biological Control. Microbiology Resource Announcements, 8 (35) e00690-19	DOI: 10.1128/MRA.00690-19
Varner, Johanna	2019	Smith A, Beever EA, ... Varner J , ... (2019). Ecoregional context, genetic affinity and within-species variation in response to climate. <i>Nature Climate Change</i> .	https://doi.org/10.1038/s41558-019-0584-8
Lavelle, Amanda	2019	Schrager-Lavelle, A. , Gath, N. N., Devisetty, U. K., Carrera, E., López-Díaz, I., Blázquez, M. A. and Maloof, J. N. (2019). The role of a class III gibberellin 2-oxidase in tomato internode elongation. <i>Plant J</i> , 97. 603-615.	doi:10.1111/tpj.14145
Hansen, Eriek	2019	Baigent, C., C. J. Agan, M. Connor, and E. S. Hansen . <i>Accepted</i> . Autopsy as a form of evisceration: Implications for decomposition rate, pattern, and estimation of postmortem interval. <i>Forensic Science International</i>	
Varner, Johanna	2019	Camp MG, Shipley L, Waterhouse BD*, Varner J (<i>in press</i>). Activity patterns and foraging behavior of American pikas (<i>Ochotona princeps</i>) differs between Craters of the Moon and alpine talus in Idaho. <i>Western North American Naturalist</i> .	
Hansen, Eriek	2019	Connor, M., C. Baigent, and E. S. Hansen . 2019. Measuring desiccation using qualitative changes: a step toward determining regional decomposition sequences. <i>Journal of Forensic Sciences</i> 64(4): 1004-1011.	DOI: 10.1111/1556-4029.14003.

Varner, Johanna & Patrice Connors	2019	Flaherty EA, Varner J , Duggan JM, Connors PK , and other Squirrel-Net authors. (in press) Incorporating course-based undergraduate research experiences (CUREs) into wildlife education. <i>The Wildlife Professional</i> .	
Hansen, Eriek	2018	Connor, M., C. Baigent, and E. S. Hansen . 2018. Testing the use of pigs as human proxies in decompositions studies. <i>Journal of Forensic Sciences</i> 63(5): 1350-1355. Hansen, E. S. and F. J. Rahel. 2015. Fish energy use among fluctuating and constant thermal regimes simulating winter conditions in rivers. <i>Transactions of the American Fisheries Society</i> 144: 990-997.	
Hansen, Eriek	2018	Hansen, E. S. , C. Baigent, S. I. Reck, and M. Connor. 2018. Bioelectrical impedance as a technique for estimating postmortem interval <i>Journal of Forensic Sciences</i> 62(4): 1186-1190.	
Varner, Johanna	2018	Kohl KD, Varner J , Wilkening JL, Dearing MD. (2018). Gut microbial communities of American pikas (<i>Ochotona princeps</i>): evidence for phyllosymbiosis and adaptations to novel diets. <i>Journal of Animal Ecology</i> . 87:323-330.	DOI: 10.1111/1365-2656.12692
McQuade, Kyle	2017	Ilacqua, et al. Theflavins from black tea affect growth, development and motility in <i>Dictyostelium discoideum</i> . <i>BBRC</i> .	https://doi.org/10.1016/j.bbrc.2017.07.058
Varner, Johanna	2017	Beever EA, Hall E, Varner J , Loosen A, Dunham J, Gahl MK, Smith FA, Lawler J. (2017). Behavioral flexibility as a mechanism for coping with climate change. <i>Frontiers in Ecology and the Environment</i> . 15(6): 299-308. (Cover story).	https://doi.org/10.1002/fee.1502
Hansen, Eriek	2015	Hansen, E. S. and F. J. Rahel. 2015. Fish energy use among fluctuating and constant thermal regimes simulating winter conditions in rivers. <i>Transactions of the American Fisheries Society</i> 144: 990-997.	
Varner, Johanna	2016	Varner J , Horns JJ*, Lambert ML*, Westberg E*, Ruff JS, Wolfenberger K*, Beever EA, Dearing MD. 2016. Plastic pikas: behavioral plasticity in low elevation pikas (<i>Ochotona princeps</i>). <i>Behavioural Processes</i> 125:63-71	doi: 10.1016/j.beproc.2016.01.009
Walla, Thomas	2015	Forister, ML., Novotny, V. Walla, T. (2015) The global distribution of diet breadth in insect herbivores. <i>Proceedings of the National Academy of Sciences</i> . Vol 112, no. 2	www.pnas.org/cgi/doi/10.1073/pnas.1423042112

Walla, Thomas	2016	Intraspecific phytochemical variation shapes community and population structure for specialist caterpillars. Glassmire AE, Jeffrey CS... Walla, TR ,... (2016) <i>The New Phytologist</i> . Vol 212:1, pp 208-219.	https://doi.org/10.1111/nph.14038
Walla, Thomas	2017	Host conservatism, geography, and elevation in the evolution of a Neotropical moth radiation. Jahner JP, Forister ML, Parchman TL, Smlanich AM, Miller JS, Wilson JS, Walla TR , Tepe EJ, Richards LA, Quijano-Abril MA, Glassmire AE, Dyer LA. <i>Evolution</i> 71-12: 2885-2900	https://doi.org/10.1111/evo.13377
Matlock, Stephanie	2008	Review of Fundamentals of Forensic Anthropology by Linda Klepinger. Published in the Applied Anthropologist Journal. 28:(1):135-136	
Matlock, Stephanie	2006	Deer mouse movements in Periodomestic and Sylvan Settings in relation to Sin Nombre virus Antibody Prevalence. Douglass, RJ, Semmens, WJ, Matlock-Coooley, SJ, and Kuenzi, AJ. <i>Journal of Wildlife Diseases</i> . 42 (4).	
Stern, Stephen	2016	S. Stern & L. Bohs. An eight marker phylogenetic analysis of <i>Solanum</i> section <i>Micracantha</i> . <i>Systematic Botany</i> 41(1):120-127	

* = mentored undergraduate student

Conference Presentations

name	year	presentation title	conference title and location
Varner, Johanna	2019	Varner J, Beever EA, Clark SC, Abbruzzese C, Shepherdson D, Shivappa S. Engaging Citizen Scientists in Post-Fire Monitoring of Columbia River Gorge Pikas	American Society of Mammalogists, 2019. Washington, DC.
Varner, Johanna	2019	Waterhouse BD*, Camp M, Shipley LA, Varner J . Activity Patterns of Pikas in an Atypical, Low-Elevation Lava Habitat. * = mentored CMU student	American Society of Mammalogists, 2019. Washington, DC.
Varner, Johanna	2019	McFarland T*, Waterhouse BD*, Varner J . Seasonal patterns of stress hormone metabolites in pika latrines. * = mentored CMU student	American Society of Mammalogists, 2019. Washington, DC.
Varner, Johanna	2019	Camp M, Shipley LA, Varner J . (2019) Activity Patterns and Foraging Behavior of American Pikas (<i>Ochotona princeps</i>) Differs Between Craters of the Moon and Alpine Talus in Idaho.	Annual Meeting of the Washington Chapter of The Wildlife Society, Society for Northwestern Vertebrate Biology, and Northwest Partners in Amphibian and Reptile Conservation. Grand Mound, WA.

Varner, Johanna	2019	Clark SC, Abbruzzese C, Beever EA, Carre B, Greenvoss A, Shephardson D, Shivappa S, <i>Varner J</i> (2019) Engaging citizen scientists in post-fire monitoring of Columbia River Gorge pikas.	Oregon Chapter of The Wildlife Society. Portland, OR.
Varner, Johanna & Patrice Connors	2019	<i>Varner J, Connors PK</i> , Brown JS, Dizney L, Duggan J, Erb LP, Flaherty EA, Hanson J, Lanier HS, Yahnke CJ. Squirreling Around for Science: Incorporating Sciurid Behavioral Research into the Undergraduate Curriculum.	Society for Integrative & Comparative Biology 2019. Tampa, FL.
Hansen, Eriek	2019	Hansen, E. S., C. Tucker, and J. Woodling. Natural hybridization of Golden Shiner (<i>Notemigonus crysoleucas</i>) and Rudd (<i>Scardinius erythrophthalmus</i>) in a Colorado USA Reservoir	American Fisheries Society, Colorado-Wyoming Chapter Annual Meeting. Fort Collins, Colorado.
Sherbenou, Megan	2019	Sherbenou, M.J.W. Maria's marathon: Effectiveness of a scalable interrupted case study in the undergraduate classroom.	Human Anatomy and Physiology Society. Portland, OR.
Ozsoy, Zeynep	2019	Ozsoy, Zeynep. Identification of the Origins of <i>Coniatus</i> spp., a Non-Native Weevil in Western North America	Riversedge West, Riparian Restoration Conference Phoenix, AZ
Stern, Stephen	2019	S. Stern. Dominant plants and habitats of western Colorado.	Invited Speaker, Colorado Native Plant Society Annual Meeting, Grand Junction, CO
Hansen, Eriek	2018	Connor, M. A., C. Baigent, and E. S. Hansen. 2018. Deconstructing desiccation and decomposition	American Academy of Forensic Sciences, 70th Annual Scientific Meeting, Seattle, WA.
Hansen, Eriek	2018	Hansen, E. S., C. Baigent, and M. A. Connor. A comparison of bioelectrical impedance analysis techniques for estimating postmortem interval (PMI).	American Academy of Forensic Sciences, 70th Annual Scientific Meeting, Seattle, WA.
Hansen, Eriek	2018	Agan, C. J., C. Baigent, M. A. Connor, and E. S. Hansen. Decomposition rates: autopsied vs. non-autopsied human remains	American Academy of Forensic Sciences, 70th Annual Scientific Meeting, Seattle, WA
Varner, Johanna & Patrice Connors	2018	<i>Varner J, Connors PK</i> , Brown JS, Dizney L, Duggan JD, Erb LP, Flaherty EA, Hanson J, Lanier HS, Yahnke CJ. Squirreling Around for Science: Incorporating Sciurid Behavioral Research into the Undergraduate Curriculum.	American Society of Mammalogists 2018. Manhattan, KS.
Varner, Johanna & Patrice Connors	2018	Duggan JM, Brown J, <i>Connors P</i> , Dizney L, Erb L, Flaherty EA, Hanson JD, Lanier HC, <i>Varner J</i> , Yahnke CJ. Squirreling around for science 301: CURE implementation & scaffolding for upper level courses.	American Society of Mammalogists 2018. Manhattan, KS.
Varner, Johanna & Patrice Connors	2018	Hanson JD, Lanier HC, Brown J, <i>Connors P</i> , Dizney L, Duggan JM, Erb L, Flaherty EA, <i>Varner J</i> , Yahnke CJ.	American Society of Mammalogists 2018. Manhattan, KS.

		Squirreling around for science 101: multi-campus implementation and piloting of a Course-based Undergraduate Research Experience.	
Ozsoy, Zeynep	2018	Ozsoy, Z Another Tamarisk Specialist Taxonomy and Biology of <i>Comatus</i> sp Found in North America	Biological Control W-4185 Annual Meeting Whitefish, MT
Varner, Johanna	2017	Varner J, Craighead A, Erb L, Garrouette E, Mueller M, Ray C. 2017. American pikas (<i>Ochotona princeps</i>) as a platform for public engagement in climate change.	American Society of Mammalogists, 2017. Moscow, ID
Varner, Johanna	2017	Waterhouse BD*, Vaca JF, Varner J. Baseline camera-trap study in the Amazonian Yasuni Biosphere Reserve.	American Society of Mammalogists 2017. Moscow. ID.
Hansen, Eriek	2017	Connor, M. A., E. S. Hansen , and C. Baigent. Measuring desiccation: a system using bioelectrical impedance analysis.	National Institute of Justice, Forensic Science Research and Development Symposium. New Orleans, LA.
Hansen, Eriek	2017	Connor, M. A., C Baigent, and E. S. Hansen . Measuring desiccation using qualitative changes	American Academy of Forensic Sciences, 69th Annual Scientific Meeting, New Orleans, LA.
Hansen, Eriek	2017	Hansen, E. S. , C. Baigent, and M. A. Connor. Bioelectrical impedance analysis as a technique for estimating the postmortem interval (PMI) in human remains.	American Academy of Forensic Sciences, 69th Annual Scientific Meeting, New Orleans, LA.
Hansen, Eriek	2017	Hansen, E. S. , S I Reck, and M. A Connor. Correlation of bioelectric impedance metrics to accumulated degree-days among body segments using gel pad electrodes	American Academy of Forensic Sciences, 69th Annual Scientific Meeting, New Orleans, LA
Hansen, Eriek	2017	Morben, K., and E. S. Hansen . Quantifying proximate body composition in Catostomids using bioelectrical impedance analysis.	Crossing Borders – Crossing Barriers. Joint Meeting of Utah and Colorado/Wyoming Chapters of the American Fisheries Society, Grand Junction, CO.
Margot Beckett	2016	Putative sucrose esters from <i>Petuma x hybrida</i> may contribute to this host's reduced susceptibility to <i>Phytophthora infestans</i>	Annual Meeting of the American Phytopathological Society. Tampa, FL
Hansen, Eriek	2016	Crippen, K. C., K. Morben, and E. S. Hansen . Quantifying Proximate Body Composition in Catostomids Using Bioelectrical Impedance Analysis.	Joint Meeting of Ichthyologists and Herpetologists, New Orleans, LA.
Varner, Johanna	2016	Varner J, Goff J, Shivappa S. 2016. Do you hear what I hear? Integrating acoustic monitoring into a pika citizen science project.	American Society of Mammalogists Minneapolis, MN
Varner, Johanna	2016	Beever EA, Clark SC, Abbruzzese C, Varner J. 2016 The Columbia River Gorge: Its microclimates, vegetation, and wildlife as a mesocosm for	<i>Oregon Chapter of the Wildlife Society Conference</i> , Portland OR.

		understanding constraints at range edges.	
Varner, Johanna	2016	Cansler CA, Brown C, Varner J, Hester A. 2016. Disturbance at treeline: A mechanism for change or stability in an era of global change?	Mtn Clim 2016, Leavenworth, WA
Ozsoy, Zeynep	2016	Ozsoy, Z. Updates on the identification of the Origins of <i>Coniatus</i> spp., a Non-Native Weevil in Western North America	Tamarisk Coalition's 13 th Annual Research and Management Conference Grand Junction, CO
Ozsoy, Zeynep	2016	Ozsoy, Z. The genetics and molecular biology of species invasions: What can biological control agents teach us?	Symposium on Mechanisms of Genome Maintenance, University of California, Davis, CA
Hansen, Eriek	2015	Crippen, K. C. and E. S. Hansen. Quantifying proximate body composition of Catostomids using bioelectrical impedance analysis.	Joint Meeting of Ichthyologists and Herpetologists, Reno, NV.
McQuade, Kyle	2015	EGCG affects growth and PIP3 signaling in <i>Dictyostelium</i> .	Annual International <i>Dictyostelium</i> Conference. London, England.

Extramural Grants

name	award dates	funding agency	objective	amount awarded
Hansen, Eriek	Jan 2016- Dec2018	National Institute of Justice	DOI: 10.1111/1556- 4029.14003.	\$258,659.50
McQuade, Kyle	2015-2019	Saccomanno Higher Education Foundation	To support undergraduate researchers at CMU	\$240,165
Ozsoy, Zeynep	2016-2020	Army Corp of Engineers	Genetic identification of beetles along Rio Grande River	\$20,556
Varner, Johanna	2018-2021	Alaska Fish and Game	To analyze pika scat for stress hormones	\$25,536.30

Varner, Johanna	2018-2020	US Forest Service	Engaging Citizen Scientists in Pika Surveys	Total \$34,243 (2 awards, administered by collaborators)
Varner, Johanna	2019	Western North American Naturalists	Pika work in the La Sal Mountains	\$2,000
Stern, Stephen	2017	National Science Foundation	Herbarium digitization (NSF ADBC award, co-PI)	\$13,326
Stern, Stephen	Aug 2015-2019	Bureau of Land Management	Floristic inventory of McInnis Canyon National Conservation Area	\$25,000

Sabbatical Leaves

name	year	project title
Margot Beckett	Spring 2019	Identity, bioactivity and mode of action of sucrose esters present in petunia leaf extracts.
McQuade, Kyle	Fall 2018	Characterizing novel interactions between amoebae and other soil microorganisms

4. Faculty curriculum vitae (Appendix C)

A summary is presented below.

Tenured/tenure-track faculty:

Margot Beckett, Associate Professor; B.S., Mesa State College; Ph.D., Cornell University.

Patrice Connors, Assistant Professor; B.S., Ithaca College; Ph.D., University of Utah.

Paul Hampton, Associate Professor; B.S., Eastern Illinois University; M.S., University of Texas at Tyler; Ph.D., University of Louisiana at Lafayette.

Eriek Hansen, Associate Professor; B.S., Utah State University; M.S., Utah State University, Ph.D., University of Wyoming, Laramie.

Amanda Lavelle, Assistant Professor; B.S., University of California at Davis; Ph.D., University of California at Davis.

Denise McKenney, Professor and former Department Head; B.S., New Mexico State University; Ph.D., North Carolina State University-Raleigh.

Kyle McQuade, Professor; B.S., Millikin University; Ph.D., University of Wisconsin.

Carrie McVean, Professor and current Department Head; B.S., D.V.M., Colorado State University.

Zeynep Ozsoy, Assistant Professor; B.S., Bogazici University, Turkey; Ph.D., University of North Carolina at Chapel Hill.

Megan Sherbenou, Assistant Professor; B.A., M.A., University of Colorado; Ph.D., University of Colorado at Denver.

Matthew Stansbury, Assistant Professor; B.S., University of Nebraska; Ph.D., University of Indiana.

Stephen Stern, Associate Professor; B.S., University of North Carolina-Asheville; Ph.D., University of Utah.

Johanna Varner, Assistant Professor; B.S., M.E., Massachusetts Institute of Technology; Ph.D., University of Utah.

Thomas Walla, Professor; B.A., University of California at San Diego; Ph.D., University of Oregon.

Denita Weeks, Assistant Professor; B.S., Grand Valley State University, Allendale, MI; M.S., California State University at Northridge; Ph.D., University of Memphis.

Steve Werman, Professor and Assistant Vice President for Academic Affairs; B.S., M.S., California State University— Long Beach; Ph.D., University of Miami.

Instructors:

Dale Call, B.S., Brigham Young University; M.D., University of Maryland.

Tracy Cyr, B.S., University of California at Riverside; M.S., Washington State University; Ph.D., University of Missouri.

Renee Good, B.S., Washington State University; Ph.D., University of Colorado at Denver.

Amy Kornkven, B.S., University of Wisconsin at Madison; Ph.D., University of Oklahoma at Norman.

Stephanie Matlock, B.A., University of Colorado-Boulder; M.S., Montana State University-Bozeman.

Judith Sirota, M.S., Michigan State University.

Shay West, B.S., Mesa State College; Ph.D. University of Colorado-Denver.

Part-time adjuncts on the main campus: The adjuncts are hired each semester, so the information below is typical of the high quality of most of our part-time people.

Matthew Garhart, B.S., Mesa State College; M.S., Colorado State University.

George Gromke, B.S., University of Illinois; DO. Midwestern University, Chicago.

Pamela McLaughlin, B.A., D.C., University of Vermont at Burlington; D.O., New Jersey School of Osteopathic Medicine.

Andrea Sellers, B.S.,D.C., Parker University College of Chiropractic.

B. Financial Information

1. Total budget revenues and program expenditures

The departmental budget has increased along with the increase in SCH since our last review. Department heads are provided with an initial budget but can request additional money during the annual budget process. Requests for additional monies must be justified. The table below lists actual budget numbers for FY13-14 and FY18-19.

Year	Course specific fees = revenue	Total expenditures	Total credit hours	Total expenditures/credit hour
FY13-14 actual	96,369	1,557,639	13,609	114.46
FY17-18 actual	110,473	2,062,140	14,503	142.19
FY18-19 original	118,781	1,885,683	15,324	123.05

The FY19-20 original budget projected that total expenditures would be \$2,161,269. Some additional money was requested for the year to cover a new faculty's start-up, salary equity adjustments, and increased printing costs. The actual numbers are not yet available.

Course-specific fees are the laboratory fees collected for each student enrolled in a Biology laboratory section. These fees are used to directly support transportation to field sites, equipment purchases, and dissection specimens and supplies necessary to conduct a laboratory course. These fees are also used to stay current in the field and are used to purchase new technology, cover software licenses, and provide laptops. The funds roll over each year, allowing funds to be "saved" for major expenditures. These expenditures have been used to replace and purchase new sets of microscopes for all the laboratory classrooms. The department has roll-over funds currently that will be used to set up WS151, a laboratory classroom that will be used for the BIOL 371L Cell and Molecular techniques lab. These funds are also used to replace worn models and broken microscopes and to upgrade laboratory experiences. Biology collects \$35/student/lab, with the exception of the human cadaver labs which collect \$100/student/lab. The department has not asked for an increase to our lab fees, but this revenue has increased with increased enrollment.

2. External funding and potential opportunities for obtaining external funds

Biology faculty can apply for professional development funds. Profession development funds are administered by the office of Academic Affairs. Faculty from across the campus can apply for these funds which support the continued growth of faculty. The maximum amount available for a faculty member is \$3000, and Biology faculty have historically been successful at securing these funds. Faculty have used these funds to travel to conferences, purchase research supplies, and purchase equipment.

The Saccomanno Internship Program in Biological Research (SIPBR) is funded by the Saccomanno Higher Education Foundation, a part of St. Mary's Hospital. This internship funds summer and academic year undergraduate research. This selective research opportunity is available to CMU students and Mesa County residents attending college under the mentorship of a faculty member. The internship students are expected to complete a research project, discuss current topics and ethics in biomedical research, read scientific publications, and present their findings at the fall symposium. SIPBR usually funds five to six student research internships annually.

The Grand Valley is surrounded by public land. Biology faculty have developed relationships with multiple state and federal agencies. Biology faculty have secured several grants with these local agencies to conduct studies on public lands. Some of these external grants have been used to identify flora at McInnis Canyons, assess the impact of off-roading on spade foot toad populations, and conduct disease surveillance on local amphibian populations. Faculty invite undergraduate students to participate in these funded projects, and these undergraduates receive funding from SIPBR. Biology faculty have also received funding from local entities such as the Audubon Society and DEAR.

C. Library Assessment

The Library Assessment for the Support of the Biology Program (Appendix D) considered all areas of the program to have a strong collection of current material available. With the addition of two new concentrations in the program, the Biology faculty and library personnel worked

cooperatively to strengthen the collection. The overall recommendations from the library did not suggest any deficiencies in the A.S. Biology, B.S. Biology, B.S. CMDB, or B.S. EEOB collections. The recommendation did note that, while only 15-17% of the print collection has been published since 2010, this is significantly augmented by the e-book collection, wherein 46-54% have been published since 2010. This was noted for all the reviews of both the Associates and Bachelors concentrations.

D. Physical Facilities

Faculty offices are located in the Wubben Science building, with most faculty members grouped together in a suite of offices on the second floor. The departments of Biology and Physical & Environmental Science share an administrative assistant, copy machines, and office space. Due to the growth of faculty numbers in both departments, the availability of faculty offices has resulted in a greater amount of faculty dispersal than in the past. Faculty from both departments are located on multiple floors and suites throughout the building. All the Biology department full-time faculty have individual offices, while part-time faculty share an office. The faculty that share tend to have teaching schedules which minimize the amount of time that they overlap with other instructors in the office. Office space overall has become limited in the Wubben Science building, which houses faculty from three departments: Biology, Physical & Environmental Sciences, and Mathematics & Statistics.

The first expansion of the Wubben Science facilities occurred in 1996 when teaching laboratory space increased from three to six teaching laboratories plus the addition of one laboratory dedicated to student research. In the 2010 expansion, our teaching laboratory space increased to seven teaching laboratories, then eight teaching laboratories with the acquisition in Fall 2012 of a first-floor space dedicated to human gross anatomy. In 2017 the electron microscope space was remodeled into a dual teaching laboratory/research space on the first floor. We currently have nine teaching laboratories. Six of the teaching labs are on the second floor, one teaching laboratory focused on plant biology is on the third floor adjacent to the greenhouse, and two laboratory spaces are found on the first floor.

The 2010 expansion included dedicated space for faculty to conduct research with undergraduate students. This undergraduate research space is located on the third floor of Wubben Science and includes three dedicated laboratories and a preparation room with an autoclave, ice machine, and negative 80 freezers. Bench space in the research laboratories is allocated based on primary research needs. Research space is also partitioned into emphasis, with one space dedicated to molecular biology and the other to organismal biology.

Housed between the dedicated undergraduate research labs is the Walter Almond Kelley Herbarium. The herbarium has access to the research space for sorting and cataloging specimens. The Biology department is currently collaborating with Colorado State University to digitize the entire herbarium collection.

While the teaching laboratory preparation room space was expanded in 2010, the increase in laboratory sections has overextended our prep rooms' functionality. The prep rooms are now crowded with the multiple laboratory carts that are used in the different laboratory sections.

Since the break between two lab sections is only ten minutes, the materials used in a preceding lab will be gathered on one cart while another cart with the next lab materials is brought in. The carts, which contain lab set-ups or used lab materials, end up parked in the prep labs. The 2010 expansion did provide much needed storage, which has allowed collections to expand. The storage space on the first floor is dedicated to field trip-related materials, making it easier to load vehicles. The conversion of the electron microscope space into a teaching lab/research space has reduced the difficulty of scheduling laboratories. We have storage space on the second floor for our mammal, bird, and herpetology collections. In the research space, we have a fluorescent microscope and a confocal microscope, as well as PCR thermocyclers, gel electrophoresis equipment, a photo-documentation system, water baths, incubators, refrigerators including two -80 °C freezers, and a Biosafety level II laminar flow hood and a fume hood. Saint Mary's Hospital, Saccomanno Research Institute donated all the equipment in their research laboratory to the Biology department this summer. A short list of donated equipment includes L8-70M ultracentrifuge, -80 °C chest freezer, cyto-spin 3, myiQ iCycler, IC63 incubator, 5430R centrifuge, water-jacketed CO₂ incubator, S2 vertical sequencing apparatus, 680 microplate reader, and DU640 spectrophotometer. This equipment enriches our undergraduate research and expands our research capabilities.

E. Instructional Technology and Equipment

All lecture rooms and laboratories at CMU are "smart" rooms with networked computers and projectors, DVD players, and document cameras. In addition, we have twelve laboratory laptops that can be moved into any lab and connected to the network. All faculty members utilize the Desire 2 Learn (D2L) platform for all their courses. Faculty computers are replaced on a regular basis, and faculty can choose either a Mac or PC.

F. Efficiencies in the Way the Program is Operated

The department operates very efficiently, with faculty teaching lecture and lab components. We efficiently schedule sections so that laboratory caps are met. With the addition of the Cellular, Molecular, and Development track we had a shift in students required to take BIOL 106/106L and BIOL 107/107L, our animal and plant courses, to BIOL 108/108L, a combination plant/animal course. Sections were adjusted to maximize SCH, and faculty shifted to courses experiencing higher demand. The program has also evaluated curriculum and removed courses from our catalogue that the Biology faculty considered non-essential. Biology faculty teach all laboratory sections without the benefit of the traditional student assistant who could help with grading and instruction. We do offer BIOL 493 Laboratory Teaching Practicum, which is a one credit hour course in which a student is under the direct supervision of the faculty member in a laboratory setting. As our laboratory size has increased to capacity in most lab sections, the student may provide much needed assistance during busy labs. Faculty utilize these students to assist with laboratory preparation and specimen dissection. Offering this type of course for credit is a very efficient and cost effective way to gain help in the labs.

Since our last review we have added an additional position to assist in laboratory preparation. Our laboratory coordinator, Mr. Rod Read, had been solely responsible for preparing laboratory materials each week, supervising student workers, and ordering materials and equipment needed

for the laboratories each year. These responsibilities have increased with the addition of sections and teaching laboratories. To help with this increased workload, Biology has added an Assistant Laboratory Coordinator position. Jude Sirota has taken over the responsibility of ordering and purchasing for the laboratories. Jude holds a split position in which she is also required to teach four lab load credits of laboratory. Faculty have also assumed more responsibility for laboratory preparation by pulling lab needs themselves and setting up the labs from the carts previously prepped by the lab coordinator. Without the assistance from our lab coordinator and assistant lab coordinator, the workload for faculty would be unmanageable.

V.

STUDENT LEARNING
OUTCOMES AND
ASSESSMENT

V. STUDENT LEARNING OUTCOMES AND ASSESSMENT

A. Student Learning Outcomes

The institution and individual departments have developed Student Learning Outcomes (SLOs) which are listed on the website. Campus-wide, all CMU baccalaureate graduates are expected to attain proficiency in specialized knowledge/applied learning, critical thinking, communication, and quantitative fluency. Recently, two additional SLOs have been added: personal and social responsibility, and information literacy. The assessment for these outcomes is in the early stages of development.

The CMU Biology concentrations have four student learning outcomes (SLOs). CMU Biology graduates will be able to demonstrate:

- Demonstrate a breadth of knowledge in the life sciences with an accompanying depth of knowledge particularly in the key areas of organismal diversity, ecology, evolution, and genetics. (Specialized Knowledge)
- Utilize the scientific approach to address novel questions and problems through the development of hypotheses, design of experiments, collection of data, analysis of data, and interpretation of results. (Quantitative Fluency/Applied Learning)
- Identify, examine, evaluate, and discuss the scientific literature. (Critical Thinking)
- Articulate biological principles and ideas effectively, both in written and oral form. (Communication Fluency)

The B.S: Secondary Education-Biological Sciences has slightly different set of student learning outcomes since it is a degree to teach science rather than just Biology:

- Utilize the scientific approach to address novel questions and problems through the development of hypotheses, design of experiments, collection of data, analysis of data, and interpretation of results (quantitative fluency/applied learning)
- Identify, examine, evaluate, and discuss the scientific literature (critical thinking)
- Articulate biological principles and ideas effectively, both in written and oral form (communication)

The Biology courses have been mapped based on student learning objectives (curriculum map in Assessment Appendix E).

In the undergraduate secondary teaching concentration, there are additional Teacher Education learning outcomes:

- Demonstrate mastery of major area's content knowledge and pedagogical strategies through fieldwork with learners in professional settings (specialized knowledge/applied learning)
- Design and establish a safe, inclusive, and respectful learning environment for a diverse population of students (specialized knowledge/applied learning)
- Plan and deliver effective instruction to students, based on research-based pedagogical practices (communication literacy/information literacy)
- Collect and analyze student assessment data and use results to inform planning and instruction (quantitative fluency)
- Demonstrate professionalism through ethical conduct, reflection, and leadership (personal and social responsibility)

B. Direct and Indirect Measurements

The indirect measurements of student achievement are obtained from the Biology graduation exit surveys and an Alumni survey (Appendix F). Both of these surveys ask about student satisfaction and perceptions of how the degree has prepared them for their career. (A copy of the questions included on the graduate exit survey is found in Appendix F). These surveys have low participation. The graduate exit survey is passed out when students sign up for the Biology exit exam, but few students return the completed survey. The alumni survey is emailed to former students who have graduated. The number of students who received the email is variable due to closed and/or abandoned email accounts. The number of respondents to the 2019 alumni survey is 127. A combined alumni survey result document includes responses from 2013-2019. Although the annual surveys have low response rates, the combined alumni survey has 778 respondents. In the combined survey, Biology alumni are satisfied with their undergraduate education, with 90% either very satisfied or generally satisfied. In the most recent survey, satisfaction decreased to 81% of alumni either very satisfied or generally satisfied. In the combined alumni survey, 80% of alumni rated their overall quality of education as very high or high. In the 2019 alumni survey, 71% rated their overall quality of education as very high or high, and none rate it as low or very low. In the combined alumni survey, 89.4% of alumni were employed either full- or part-time, with 75.1% of those working in their field of study. Other relevant alumni information: 31% of our alumni have enrolled in graduate or professional schools, and another 21% planned to. The Biology program has a thriving pre-med program and undergraduate research opportunities, which have inspired many students to pursue further education. The addition of tracks has also created a clear sequence of courses that students should take in order to acquire a skill set for certain career goals.

The other indirect measure is our compiled exit surveys from 2017-19. Only 34 students have completed and returned their survey in a 3 year period. Of the completed survey, 85% were satisfied or very satisfied with the content and structure of the program which is lower than the 90% satisfaction seen in the previous review. Students did rate their improvement in competency in critical thinking skills, quantitative reasoning, written communication skills, and oral

communication skills at an average of 4 plus in a scale of 1-5 with 5 being a great deal. In the previous review our students rated our laboratory classroom facilities highly due to our building addition but in this review period only 68% of students rated our facilities as; being somewhat or very satisfied with the quality of the facilities and equipment in labs.

Our direct measurements include course assessments and the Major Field Tests (MFT) for all biology students graduating in a concentration. Additionally the students earning a secondary teacher licensure take the PRAXIS II licensure exams.

Our direct measurements for assessment of our program are done in the four core courses that are taken by the B.S. Biology, B.S. CMDB, and B.S. EEOB tracks.. These courses are: BIOL 105/105L Attributes of Living Systems, BIOL 208/208L Fundamentals of Ecology and Evolution, BIOL 301/301L Principles of Genetics, and BIOL 483 Senior Thesis. The exception is the B.S. Secondary Education-Biology which only requires BIOL 105/105L and BIOL 483 the freshman and senior level courses. (Assessment summary – Appendix G).

The program assesses four outcomes: Specialized Knowledge, Quantitative Fluency, Critical Thinking, and Communication Skills.

Outcome 1--Specialized Knowledge is assessed in BIOL 105 and BIOL 301 by utilizing with pre and post tests to determine whether foundational knowledge is accumulated. Post-test scores have a benchmark of greater than 70%, and the benchmark was met. Outcome 2--Quantitative Fluency is assessed as part of a BIOL 105L laboratory exercise. A rubric is used to determine whether objectives were met. The rubric assesses hypothesis formulation, experimental design, statistical tools and graphing, and basis for a conclusion. Both hypothesis formulation and experimental design objectives were "Met" but at the freshman level students understanding of statistical tools/graphing and forming a basis for a conclusion were not yet developed sufficiently. Outcome 3--Critical Thinking and Outcome 4--Communication Skills are assessed jointly in a comparison of assignments in a sophomore versus senior level course. In both courses, students are asked to read primary literature and then summarize the research. Random artifacts were selected from the courses for faculty to assess. A rubric was used to score communication and critical thinking skills. The average percent score in BIOL 208 was 59% versus BIOL 483 at 71%. Senior level students had improved communication and critical thinking skills. Assessment of courses is ongoing and rubrics need to be further developed, but we have closed the loop and are assessing at a variety of levels in the program. More years of assessment are needed to determine whether benchmarks are appropriate.

The data from the MFT can be found in Appendix B. This is an exit exam for all graduating seniors which does not count toward graduation. The MFT data provide four subscores in: (1) Cell Biology; (2) Molecular Biology and Genetics; (3) Organismal Biology; and (4) Population Biology, Evolution, and Ecology. The subscores have been relatively consistent in six years of data. The mean subscores for all categories hover between 50 and 55. These data are used as part of assessment and curriculum. To improve the subscores in categories 1 and 2, the B.S. Cellular, Molecular, and Developmental track was developed. This track is for students interested in pursuing a graduate or professional program. There are also nine assessment indicators in Biochemistry and Cell Energetics; Cellular Structure, Organization, and Function; Molecular

Biology and Molecular Genetics; Diversity of Organisms; Organismal-Animals; Organismal-Plants; Population Genetics and Evolution; Ecology; and Analytical Skills. The assessment indicator for Biochemistry and Cell Energetics had been consistently in the 30% correct range in the years prior to adding faculty with expertise in molecular biology. This score now sits in the 39-40% range with the addition of the CMDB track. While there have been some ups and downs over the years, most of the other assessment indicators have stayed in the 40-50% correct range, making it appear that the program provides a broad education. With the addition of the cellular molecular track, the organismal assessment mean percent scores may be dropping slightly. CMDB students are not required to take a full semester of both animal and plant biology. Since students do not typically study for the MFT and their scores do not affect graduation, the data from MFT may not be as useful as it could be. While MCAT and GRE scores would be reliable indicators, the number of students who take those exams is small compared to the number of graduating seniors taking the exit exam.

For the Biology, Secondary Education concentration, the main direct measure of the success of the program has been the PRAXIS II licensing exam taken by all majors. Appendix B contains the most recent licensing exam results. The results have been excellent. Between 1/17/07 and 4/29/13, a total of 34 majors have taken the exam, with only three students failing (91% success rate). Assessment data are included in the Appendix. The MFT had been eliminated for the teacher education students because of their relatively weak Biology content preparation (core courses in BIOL 105/105L, 106/106L, 107/107L, and ten upper-level Biology electives), so we do not currently have MFT data specifically for this concentration. The MFT requirement has been added back in order to help identify any areas of deficiency that could be corrected and will provide more assessment information in the future.

Other changes to the secondary education program included the addition of a new required course, BIOL 385 Nature and Philosophy of Science, and requiring the same capstone course of BIOL 483 Senior Thesis as all our other Biology concentrations. While the program did not receive accreditation by NCATE, the National Science Teachers Association (NSTA) SPA report as part of our NCATE application did give guidance on ways to improve the program, which we implement where possible. A copy of the NSTA SPA report evaluation as part of our NCATE application has been included in Appendix B. NCATE has been replaced by the Council for the Accreditation of Educator Programs (CAEP). However, there are no plans to seek CAEP accreditation at this time. The unique science licensure in Colorado, rather than licensure only in Biology, does not align well with the national accrediting body.

Essential learning courses are assessed at a campus-wide level and have regular evaluation and assessment on a rotation schedule. The campus uses both indirect and direct measures with course assessments. Essential learning in the natural sciences was to assess Quantitative Fluency. The assessment of Quantitative Fluency in the BIOL 101/101L occurred in 2017 but was deemed unassessable (meeting notes Appendix H). Artifacts were collected from an assignment, but the rubric used to assess those artifacts was ill-fitted. Results of that assessment are not considered usable, and the assignment and rubric have both been redesigned. The next assessment is scheduled for spring 2020. Once an assessment method for Quantitative Fluency has been established, that data will be evaluated to improve the essential learning curriculum.

C. Program Improvements

In the previous review, several courses had been added to our major's curriculum to assure that our students had a broad education in Biology. These required courses included BIOL 208/208L Fundamentals of Ecology and Evolution, and students had to choose between BIOL 302 Cellular Biology, BIOL 341/341L General Physiology, or BIOL 421/421L Plant Physiology. These course requirements addressed deficiencies in ecological and evolutionary understanding and the knowledge of the molecular biology processes. Changes to curriculum in the previous review were also done to improve our offerings to students in other programs. Biology began offering a Human Cadaver lab course for our pre-med majors, the Kinesiology program, and the Nursing department. BIOL 409/409L Gross and Developmental Human Anatomy can be used on Biology program sheets to fulfill Additional Biology credit in the Anatomical and Physiological category, and as an elective in the Exercise Science concentration in Kinesiology and Nursing programs. A modification to BIOL 250/250L General Microbiology broadened the coverage of the role of microorganisms in the environment, allowing the department to offer this course in the GT Pathways Essential Learning category. In addition to providing an excellent general education choice for non-majors, it is now required by the pre-nursing students. This course provides important background information about microorganisms and their role in health and disease.

While the addition and requirement of specific courses addressed shortfalls in our students' education, they did not address the needs of students desiring a specialized education. The development of concentrations in our program has helped to direct students into coursework that helps them to assemble the skills and knowledge necessary to pursue a specific career path. The disadvantage of having only the one concentration (B.S. Biology) was evident in the area of advising. The students who were interested in graduate school or pre-med had to be directed to complete organic chemistry in order to be competitive, but organic chemistry was not required in the program. The change to multiple concentrations has improved the preparation of our majors for specific fields by ensuring that necessary prerequisites are completed. Student comments on exit surveys had suggested that they would like to see the necessary coursework for their future plans included on their program sheet. The department originally only had a B.S. Biology. This concentration still contains the largest number of majors and is designed for students wanting a broad education in the biological sciences. This degree contains a core which exposes students to cellular, molecular, physiological, organismal, and ecological coursework. Students then have flexibility to choose additional biology electives in three out of four categories: Category 1, cellular, developmental, and molecular; Category 2, organismal; Category 3, anatomical and physiological; and Category 4, ecology, evolution, and systematics. Students end up with a broad education but are able to choose between electives to focus the degree toward their interests.

The two new concentrations are designed with specific career tracks in mind. These tracks lay out coursework that is essential to specific careers or acceptance into a graduate program. The B.S. in Cellular, Molecular, and Developmental Biology (CMDDB) contains a course sequence that meets the requirements of students who wish to apply to graduate programs. It starts with a more traditional freshman two-semester course sequence of General Biology: BIOL 105/105L Attributes of Living Systems and BIOL 108/108L Diversity of Organisms. The other core courses are also included: BIOL 208/208L Ecology and Evolution, BIOL 301/301L Principles

of Genetics, and BIOL 483 Senior Thesis. This degree has additional requirements which include MATH 151 Calculus, CHEM 311/311L/312/312L Organic Chemistry I & II, CHEM 315/315L Biochemistry, BIOL 302 Cellular Biology, and BIOL 310/310L Developmental Biology. The course requirements for this degree contain the prerequisites necessary to apply to medical schools or other graduate programs. The data from our alumni survey finds that 31% of our graduates have enrolled in a graduate or professional program since graduation and another 22% plan to. Preparing students with the right courses and offering undergraduate research opportunities is important to students wanting additional education to reach their career goals.

The other concentration addition is the B.S. in Ecology, Evolution, and Organismal Biology (EEOB). The core courses mirror the B.S. Biology. These include BIOL 105/105L Attributes of Living Systems, BIOL 106/106L Principles of Animal Biology, BIOL 107/107L Principles of Plant Biology, BIOL 208/208L Ecology and Evolution, BIOL 301/301L Principles of Genetics, and BIOL 483 Senior Thesis. This provides students with a broad range of coverage in the field of Biology. The concentration distinguishes itself by requiring BIOL 403 Evolution and BIOL 405/405L Advanced Ecological Methods. Students also are not required to choose courses from three out of four Additional Biology categories. Students can choose 20 credits from any category, allowing students to take more organismal, ecology, or systematics courses. This degree is designed for students who would like to work for wildlife and land management agencies.

Faculty members have also sought ways to improve student success in our courses. Our faculty utilize BIOL 493 Teaching Practicum students in laboratories. Having a knowledgeable student to assist other students in a laboratory is a valuable resource for faculty and provides an excellent learning environment for the student. Faculty encourage students to use the Tutorial Learning Center, and they nominate students to fill the tutor positions. Margot Beckett, Associate Professor, has been active in the development of a Writing Center on campus. The center opened recently, and faculty encourage students to take advantage of this campus resource in preparation for BIOL 483 Senior Thesis.

The department continues to support students seeking a minor in either Forensic Science or Forensic Anthropology. Departmental faculty teach many of the required and/or elective courses necessary for these minors. A list of some of these courses includes BIOL 217/217L Forensic Entomology, BIOL 410/410L Human Osteology, and BIOL 344/344L Forensic Molecular Biology. Additionally, many Biology students interested in forensic science have had the opportunity to participate in internships at the Colorado Bureau of Investigation (CBI) and the Forensic Investigative Research Station (FIRS, aka body farm).

Some other significant changes include faculty from the department actively engaged in the development of a writing center on campus. The Writing center opened recently and is utilized by students needing to strengthen their communication skills. This center will be important for student's successful completion of the senior thesis course. The department has also scheduled an open space in all faculty schedules on Thursdays between 12:30-2pm so that department meetings can be held on a more regular basis throughout the semester. The regular scheduling of a faculty period has allowed faculty to meet for searches, departmental committee activities and as a whole department to make decisions about our program.

VI.

FUTURE PROGRAM
PLANS

VI. FUTURE PROGRAM PLANS

A. Vision

Our vision is to provide students with a high quality undergraduate education that facilitates student success. This is accomplished with exceptional teachers who value undergraduate research and have a desire to mentor students. To facilitate our vision, faculty provide some unique opportunities for our students which include offering a broad selection of additional biology courses, engaging students in undergraduate research courses, establishing paid research internships, facilitating student contact with local agencies, serving as club advisors for GEMS (pre-med) and Fish & Wildlife, and supporting the Forensic Science minors.

Faculty continue to improve our program and the advising of our majors to better meet the needs of our diverse group of student interests. Program and advising improvements have been accomplished with the development of our new concentrations, which gave the department an opportunity to assess our curriculum and set up course sequences in the concentrations that prepare a student for a particular career goal. Demographic data in the MFT suggest that approximately 50% of our Biology graduates plan to continue their education in graduate programs. Majors graduating in the CMDB track often pursue careers in health care as medical doctors, osteopathic doctors, physician assistants, physical therapists, or research scientists. Those students who major in EEOB pursue careers with state and federal agencies that require further education to advance in the fields of fisheries, wildlife management, range management, or forestry, to name a few options.

The Biology faculty believe in supporting our faculty so that we can build a strong program in which all faculty are successful. The department wants to foster both student and faculty success. To accomplish the goal of building a program filled with successful faculty, we support our faculty in multiple ways. We have faculty coordinators for courses with multiple sections who organize labs and set the course schedule. New faculty often attend labs taught by other instructors to help them prepare to teach the labs themselves. Faculty are willing to share their teaching resources. Faculty mentor other faculty on advising, on dealing with disruptive students, and classroom expectations. Faculty members have acquired equipment and funding sources which are shared with others to get research projects up and running. Involving undergraduate students in faculty research projects is one of the department's priorities, and assisting new faculty is essential to their success in launching an undergraduate research project. Having an undergraduate research program is not only essential to faculty success, but it is increasingly important to student success. The Association of American Medical Colleges data states that 85% of accepted medical school applicants have had undergraduate research experience. Medical school applicants cannot just rely on good grades and MCAT scores to be accepted into medical school; increasingly, they rely on other unique experiences.

In the last few years, the department established a committee to look into the development of a Masters program. The committee discussed the advantages and disadvantages of a Masters program. Some of the advantages are location and access to state/federal agencies. The areas of concern were institutional support, faculty load, and impact on undergraduate research. Over the summer, faculty and alumni were polled separately on developing a program. The Biology

faculty were split 50:50 on developing a Masters program, with many wanting to maintain a strong undergraduate research program. The summer 2019 alumni polling had a response rate of 69 former students. Of those, 41.5% expressed an interest in a Masters program, but most wanted it to be part-time in the field of biomedical/cellular and molecular Biology research. The department had felt that the most feasible Masters program would be a collaborative effort between CMU faculty and local state/federal agencies in the fields of fish and wildlife management and ecology. Multiple factors have resulted in the department choosing not to pursue a Masters program at this time, including: a split faculty vote, an administration that is not supportive, and the mismatch in feasibility between potential students and Biology faculty. This mismatch in feasibility is due to a lack on research bench space for molecular work, but we can offer field work opportunities for a Masters project. While a Masters program has been tabled, it will continue to be on the departmental radar for the future as circumstances change.

B. Strengths and Challenges

The faculty members in the Biology Department are dedicated teachers who strive to provide a quality, personal education. The CMU Biology faculty interact with students in the classroom and outside of the classroom and have the opportunity to get to know their students. Faculty instruct both lecture and laboratory sections so that students have time to interact with faculty. Students and faculty also work collaboratively outside the classroom doing activities such as undergraduate research, club projects, and advising sessions. CMU Biology faculty also actively mentor and support other faculty members. Teaching is a collaborative effort in which courses build upon each other, and courses with multiple sections need to be coordinated. Faculty work together to set up lab exams, they mentor new instructors, and they share course resources so that students get the best learning experience. This collaboration between faculty members extends beyond the classroom, with departmental faculty finding ways to facilitate undergraduate research participation, creating funding opportunities, training others how to advise, and mentoring faculty through the tenure and promotion process.

Our department wants to either maintain some aspects of our program or to improve them. Some areas have been identified that deserve attention. One challenge is maintaining the personal experience that previous students have had with the CMU Biology faculty. With the growth in the program, our class sizes have increased and, although our faculty teach laboratory sections, the time to interact with students is more limited. The addition of new faculty will allow the department to offer more sections of courses but will likely not reduce class sizes. The additions of the tracks have increased faculty-student interactions since students often take multiple courses from a faculty member. Hopefully the program will continue to provide students with a personal experience with a smaller group of Biology faculty if not with the departmental faculty as a whole.

Assessment is always an area that needs to be evaluated and improved. Our assessment plan continues to be developed and the changes that have been instituted re-evaluated. The department uses indirect methods to assess our students' success. The department has set up a Facebook page for alumni that allows the department to follow our students informally, but we also use it for fundraising and to disperse information. The Facebook page has helped us to maintain stronger ties with our graduates. Other methods used to assess our program include the

alumni surveys which are sent out by the institution. The more direct parts of the assessment plan include the assessments of core courses and MFT data. The department has used MFT data to add courses to our core and seen improvements in overall student subscores. Overall the MFT subscores fluctuate but remain stable year after year (subscores in lower 50s). With the development of tracks, the MFT may show some changes to subscores in cellular, molecular, organismal, or ecology depending on the track under which a student graduates. These tracks have been implemented recently, so trends are hard to determine but they may yield valuable information to further improve our program. While MFT scores are used for assessment, this exit exam does not count toward graduation and students are not expected to study for it. Recently, MCAT has begun distributing student scores back to institutions, and this may provide some direct assessment data on a small number of students graduating from our program.

Undergraduate research is another one of the strengths of our program, and faculty have developed opportunities for students to participate in a vigorous undergraduate research program. These opportunities include the Saccomanno internship program, which has five to seven students participating in undergraduate research annually with a faculty mentor, and other students participate in undergraduate research during the academic year while enrolled in BIOL 387 Structured Research, BIOL 482 Senior Research, or 487 Advanced Research. These ‘permission only’ courses are set up by individual faculty to engage undergraduates in 1-4 credit hours of research per semester.

Undergraduate research enrollment: Research courses taught in addition to 12 credit per semester load with some load reduction if possible: 0.2 hour load per student credit hour

Course	2014-15		2015-16		2016-17		2017-18		2018-19	
BIOL	enrolled	SCH	enrolled	SCH	enrolled	SCH	enrolled	SCH	enrolled	SCH
387	43	71	40	57	31	50	22	41	16	28
482			1	2					1	2
487	11	23	17	31	7	8	7	14	3	4
totals	54	94	58	90	38	58	29	55	20	34

One of the challenges within the last three years has been the resignation of four tenured/tenure-track faculty, who have been replaced by incoming faculty but who, as new faculty, are only beginning to develop their research programs. This is reflected in the table above, where the number of students enrolled in undergraduate research has experienced a sharp decline in recent years. Building a strong research program requires that we facilitate the development of our faculty’s undergraduate research programs and that we retain those faculty. To facilitate the development of undergraduate research, faculty have formed collaborations within the program and with local entities to provide students with undergraduate research opportunities. The main challenge we face is how to increase participation in research activities with our faculty time constraints. Faculty have a heavy teaching load (12 credits /semester), they advise 30-50 students, serve on committees, and participate in orientation/registration events. Engaging students in undergraduate research requires mentoring, time to train a student to use equipment, and the attainment of financial support for laboratory equipment and supplies. Faculty also provide guidance to undergraduate students presenting in Student Showcase and/or the Saccomanno fall symposium. Involving students in undergraduate research requires a large time

commitment from a faculty member. The mechanism currently in place to calculate a teaching load reduction is insufficient, making it difficult to provide faculty research mentors with enough time to provide quality undergraduate research experiences for all the students who want it. The addition of a new tenure-track hire would strengthen our curriculum and our undergraduate research program.

Teaching is our strength, and we have exceptional tenured/tenure track faculty, but we also have a well-qualified pool of full-time instructors. The majority of our full-time instructors and part-time lecturers have a doctorate, and they have chosen to devote their time to teaching.

C. Potential Resources

In addition to current resources, the department has developed relationships that will continue to provide additional resources. Dr. Kyle McQuade established a relationship with Saint Mary's Hospital and the Saccomanno internship program which will provide future students with internships, equipment donations, and funds for supplies. BIOSINQ, which was initiated by Dr. Tom Walla, has held fundraising events and developed a connection with our alumni. As a department, we have worked to develop and maintain a relationship with our alumni. Alumni are invited to participate in biology-hosted events (BIOSINQ evenings/box at basketball games), and we have implemented a Biology graduation pinning ceremony. Maintaining a relationship with our alumni through Facebook and departmental events has been beneficial for fundraising. Other sources of funding include grants from local agencies (BLM, CPW, Fish and Wildlife) to perform research projects on public lands. The department could also receive funding from the Alumni Association, partnerships with technology firms, grants from non-profit organizations, or local business donations.

VII.

APPENDICES

Appendix A

Biology Departmental Data



Department of Biological Sciences

Departmental Data Report, 2014-15 through 2018-19

Prepared August 2018
by the Office of Institutional Research, Planning, and Decision Support

Majors

	2014-15		2015-16		2016-17		2017-18		2018-19	
	1st Major	All	1st Major	All	1st Major	All	1st Major	All	1st Major	All
Biological Sciences										
BS										
Biology	491	510	459	475	396	410	327	337	277	286
Cellular, Molecular, and Developmental Biology			39	39	84	85	124	127	159	162
Ecology, Evolution, and Organismal Biology			17	17	38	39	65	65	80	80
Pre-Secondary Education	11	11	12	13	12	12	13	14	8	8
Secondary Education	5	7	6	6	4	6	6	6	6	6
Biology Prov Bacc	27	27	16	16	24	24	15	16	21	21
Subtotal	534	555	549	566	558	576	550	565	551	563
Liberal Arts										
AS										
Biology	82	99	79	101	61	81	58	81	37	56
Subtotal	82	99	79	101	61	81	58	81	37	56
Biological Sciences Total	616	654	628	667	619	657	608	646	588	619

Degrees Awarded

	2014-15		2015-16		2016-17		2017-18		2018-19	
	1st Major	All	1st Major	All	1st Major	All	1st Major	All	1st Major	All
Biological Sciences										
BS										
Biology	55	55	70	70	68	68	56	58	34	34
Cellular, Molecular, and Developmental Biology			1	1			6	6	12	12
Ecology, Evolution, and Organismal Biology					6	6	13	13	5	5
Secondary Education	1	1	3	3	1	1	3	3		
Subtotal	56	56	74	74	75	75	78	80	51	51
Liberal Arts										
AS										
Biology	3	3	11	11	8	8	6	6	8	8
Subtotal	3	3	11	11	8	8	6	6	8	8
Biological Sciences Total	59	59	85	85	83	83	84	86	59	59

Minors

	2014-15	2015-16	2016-17	2017-18	2018-19
Completed					
Biology	4	4	9	8	6
Forensic Science	3	1			2
Completed Total	7	5	9	8	8
Enrolled					
Biology	18	23	36	33	32
Forensic Science	15	15	11	12	16
Enrolled Total	33	38	47	45	48

Credit Hours by Student

	2014-15		2015-16		2016-17		2017-18		2018-19	
	Enrolled	SCH	Enrolled	SCH	Enrolled	SCH	Enrolled	SCH	Enrolled	SCH
BIOL										
FR	1319	2669	1357	2724	1321	2677	1118	2267	1166	2351
SO	2804	5988	2906	6182	2920	6259	2913	6281	2831	6016
JR	1314	2936	1351	3040	1431	3223	1754	3974	1646	3660
SR	1906	4176	2164	4802	2153	4798	2273	5125	2146	4828
Grad										
Non-Deg	54	121	47	96	49	109	38	93	56	122
BIOL Subtotal	7397	15890	7825	16844	7874	17066	8096	17740	7878	17042
ESSL										
SO										
JR			24	72	24	72	1	3	1	3
SR			47	141	47	141	22	66	25	75
ESSL Subtotal			16	48	16	48	8	24	6	18
Biological Sciences Total	7397	15890	7825	16844	7961	17327	8127	17833	7910	17138

Credit Hours by Course

	2014-15		2015-16		2016-17		2017-18		2018-19	
	Enrolled	SCH	Enrolled	SCH	Enrolled	SCH	Enrolled	SCH	Enrolled	SCH
BIOL										
100	3274	6574	3265	6523	3138	6262	3019	6045	2861	5735
200	2637	6094	2891	6593	3181	7337	3617	8369	3621	8124
300	752	1631	875	1935	867	1945	708	1595	800	1847
400	734	1591	794	1793	687	1519	752	1731	564	1272
500+					1	3			32	64
BIOL Subtotal	7397	15890	7825	16844	7874	17066	8096	17740	7878	17042
ESSL										
200					87	261	31	93	32	96
ESSL Subtotal					87	261	31	93	32	96
Biological Sciences Total	7397	15890	7825	16844	7961	17327	8127	17833	7910	17138

Biological Sciences Departmental Data, 2019

Subject	Course	2014-15		2015-16		2016-17		2017-18		2018-19							
		Cr Hrs	Sect	Enrolled	SCH	Sect	Enrolled	SCH	Sect	Enrolled	SCH	Sect	Enrolled	SCH			
101	General Human Biology-GTSC1	3	15	1048	3144	15	1021	3063	16	1033	3099	15	955	2865	15	902	2706
101L	General Human Biol Lab-GTSC1	1	42	1056	1056	42	1050	1050	43	1054	1054	39	959	959	37	907	907
102	Plant/Anim Biodiversity-GTSC1	3	2	70	210	2	97	291									
102L	Plant/Anim Biodivers Lab-GTSC1	1	3	69	69	4	98	98									
105	Attri Living Systems-GTSC1	3	6	264	792	5	268	804	6	250	750	6	296	888	6	275	825
105L	Attri Living Syst Lab-GTSC1	1	12	248	248	11	255	255	12	245	245	12	284	284	12	260	260
106	Principles of Animal Biology	3	3	122	366	4	135	405	3	101	303	3	94	282	2	88	264
106L	Prin of Animal Biol Lab	1	6	109	109	7	126	126	6	99	99	6	94	94	4	88	88
107	Principles of Plant Biology	3	4	146	438	4	108	324	4	120	360	3	91	273	2	92	276
107L	Prin Of Plant Biology Lab	1	6	142	142	6	107	107	6	120	120	5	92	92	4	92	92
108	Diversity of Organisms-GTSC1	3															
108L	Diversity of Orgnisms Lab-GTSC1	1															
203	Human Nutrition	3	2	102	306	2	87	261	2	93	279	2	93	279			
208	Fund of Ecology & Evolution	3	2	91	273	2	93	279	2	87	261	2	127	381	2	115	345
208L	Fund of Ecol & Evol Lab	1	4	90	90	4	91	91	4	88	88	6	128	128	6	120	120
209	Human Anatomy and Physiology	3	11	660	1980	13	762	2286	13	786	2358	14	802	2406	14	808	2424
209L	Human Anatomy & Physiology Lab	1	27	619	619	29	706	706	31	750	750	31	739	739	33	766	766
210	Human Anatomy/Physiology II	3	10	367	1101	10	370	1110	10	407	1221	11	474	1422	11	455	1365
210L	Human Anat/Physiology II Lab	1	17	346	346	17	375	375	18	406	406	20	451	451	20	435	435
217	Forensic Entomology	2	1	16	32	1	16	32				1	18	36			
217L	Forensic Entomology Lab	1	1	16	16	1	16	16				1	18	18			
241	Pathophysiology	4	8	316	1264	9	333	1332	9	376	1504	10	394	1576	10	409	1636

Biological Sciences Departmental Data, 2019

Subject	Course	Cr Hrs	2014-15		2015-16		2016-17		2017-18		2018-19						
			Sect	Enrolled	SCH	Sect	Enrolled	SCH	Sect	Enrolled	SCH	Sect	Enrolled	SCH			
250	Intro to Microbiology-GTSC1	3	1	23	69	1	21	63	2	94	282	4	187	561	4	260	780
250L	Intro/Microbiology Lab-GTSC1	1-2	1	23	46	1	21	42	4	94	188	8	186	372	11	253	253
301	Principles of Genetics	3	2	124	372	3	136	408	4	149	447	4	146	438	4	172	516
301L	Principles of Genetics Lab	1	5	111	111	5	115	115	6	135	135	6	118	118	6	132	132
302	Cellular Biology	3	1	41	123	2	83	249	2	72	216	2	63	189	2	66	198
310	Developmental Biology	3				1	19	57	1	5	15				2	47	141
310L	Developmental Bio Lab	2				1	19	38	1	5	10				2	47	94
315	Epidemiology	3	1	30	90				1	38	114						
316	Animal Behavior	3				1	21	63	1	21	63				1	17	51
316L	Animal Behavior Laboratory	1				1	21	21	1	21	21				1	17	17
320	Plant Systematics	3				1	14	42				1	14	42			
321	Taxonomy of Grasses	2	1	8	16				1	10	20				1	4	8
321L	Taxonomy/Grasses Lab	2	1	8	16				1	10	20				1	4	8
322	Plant Identification	2				1	13	26				1	14	28			
322L	Plant Identification Lab	2				1	13	26				1	14	28			
331	Insect Biology	3	1	12	36				1	20	60				1	11	33
331L	Insect Biology Lab	2	1	12	24				1	19	38				1	11	22
332	Intro to Geog Info Systems	2	2	3	6	2	6	12	1	4	8						
332L	Intro to Geo Info Sys Lab	1	2	3	3	2	6	6	1	4	4						
333	Marine Biology	3	1	30	90				1	44	132				1	27	81
335	Invertebrate Zoology	3	1	23	69				1	8	24						
335L	Invertebrate Zoology Lab	1	1	23	23				1	8	8						
336	Fish Biology	3				1	21	63				1	15	45			

Biological Sciences Departmental Data, 2019

Subject	Course	Cr Hrs	2014-15		2015-16		2016-17		2017-18		2018-19			
			Sect	Enrolled	SCH	Sect	Enrolled	SCH	Sect	Enrolled	SCH	Sect	Enrolled	SCH
336L	Fish Biology Laboratory	1			1	21	21			1	14	14		
337	Criministics	3	1	14	42									
337L	Criministics Laboratory	1	1	14	14									
341	General Physiology	3	2	68	204	2	82	246	2	62	186	2	60	180
341L	General Physiology Lab	1	3	63	63	4	76	76	3	56	56	3	57	57
343	Immunology	3				1	29	87				1	25	75
344	Forensic Molecular Biology	3	1	17	51				1	9	27			
344L	Forensic Molecular Biology Lab	1	1	16	16				1	8	8			
350	Microbiology	3	1	39	117				1	44	132			
350L	Microbiology Laboratory	1	2	38	38	2	50	50	2	39	39	2	32	32
371L	Cell and Molecular Lab	3				1	14	42	1	13	39	1	37	111
385	Nature/Philosophy of Science	3	1	12	36				1	9	27			
387	Structured Research	1-4	24	43	71	26	40	57	22	31	50	16	22	41
396	Topics	2-3				5	58	134	1	23	46	3	52	122
403	Evolution	3	1	17	51				1	30	90	1	41	123
405	Adv. Ecological Methods	3				1	14	42	1	7	21	1	15	45
405L	Adv. Ecological Methods Lab	2				1	14	28	1	7	14	1	15	30
406	Plant-Animal Interactions	3										1	24	72
408	Desert Ecology	3	1	29	87				1	32	96			
409	Gross/Dev Human Anatomy	2	2	89	178	2	92	184	2	83	166	2	91	182
409L	Gross/Dev Human Anat Lab	2	4	89	178	4	92	184	4	83	166	4	91	182
410	Human Osteology	3	1	24	72				1	11	33			
410L	Human Osteology Lab	1	1	24	24				2	11	11			

Biological Sciences Departmental Data, 2019

Subject	Course	Cr Hrs	2014-15		2015-16		2016-17		2017-18		2018-19	
			Sect	Enrolled	Sect	Enrolled	Sect	Enrolled	Sect	Enrolled	Sect	Enrolled
411	Mammalogy	3	1	17	1	17	1	19	1	24	1	24
411L	Mammalogy Laboratory	1	1	17	1	17	1	19	1	24	1	24
412	Ornithology	3	1	22	1	22	1	25	1	24	1	24
412L	Ornithology Laboratory	1	1	21	1	21	1	25	1	24	1	24
413	Herpetology	3	1	16	1	16	1	19	1	19	1	18
413L	Herpetology Laboratory	1	1	16	1	16	1	19	1	19	1	17
414	Freshwater Ecology	3	1	17	1	17	1	25	1	24	1	24
414L	Freshwater Ecology	1	1	17	1	17	1	24	1	24	1	24
415	Tropical Ecosystems	2	1	10	1	10	1	19	1	19	1	19
416	Ethology	3	1	14	1	14	1	19	1	19	1	18
416L	Ethology Laboratory	1	1	14	1	14	1	19	1	19	1	17
418	Wildlife Management	3	1	25	1	25	1	27	1	14	1	14
418L	Wildlife Field Techniques	2	1	25	1	25	1	27	1	14	1	14
421	Plant Physiology	3	1	26	1	26	1	27	1	27	1	27
421L	Plant Physiology Laboratory	1	1	26	1	26	1	27	1	27	1	27
423	Plant Anatomy	3	1	19	1	19	1	19	1	19	1	19
423L	Plant Anatomy Laboratory	2	1	19	1	19	1	19	1	24	1	24
425	Molecular Genetics	3	1	14	1	14	1	17	1	23	1	23
431	Animal Parasitology	3	1	18	1	18	1	18	1	26	1	26
431L	Animal Parasitology Lab	1	1	18	1	18	1	18	1	26	1	26
433	Marine Invert Communities	3	1	11	1	11	1	11	1	11	1	11
441	Endocrinology	3	1	7	1	7	1	7	1	8	1	8
442	Pharmacology	3	1	37	1	37	1	37	1	37	1	37
			2	71	2	71	2	68	2	74	2	65
			2	213	2	213	2	204	2	222	2	195

Biological Sciences Departmental Data, 2019

Subject	Course	Cr Hrs	2014-15		2015-16		2016-17		2017-18		2018-19			
			Sect	Enrolled	SCH	Sect	Enrolled	SCH	Sect	Enrolled	SCH	Sect	Enrolled	SCH
450	Mycology	3	1	24	72	1	22	66	1	22	66	1	22	66
450L	Mycology Laboratory	2	1	24	48	1	22	44	1	22	44	1	22	44
482	Senior Research	2	1	1	2	1	1	2	1	1	2	1	1	2
483	Senior Thesis	2	6	68	136	6	74	148	10	92	184	8	83	166
487	Advanced Research	1-3	8	11	23	12	17	31	5	7	8	6	7	14
493	Teaching Practicum	1	8	15	15	13	22	22	14	20	20	13	19	19
495	Independent Study	1-3	3	3	4	2	2	2	1	1	1	4	5	8
496	Topics	1-3	8	158	374	5	114	284	1	32	64	1	24	48
499	Internship	1-6	8	14	26	7	11	23	10	15	36	10	12	27
500	Advanced Human Anatomy	3												
500L	Advanced Human Anatomy Lab	1												
533	Marine Invertebrate Community	3												
BIOL Subtotal			300	7397	15890	324	7825	16844	324	7874	17066	318	8096	17740
ESSL														
290	Milestone	3												
ESSL Subtotal														
Biological Sciences Total			300	7397	15890	324	7825	16844	327	7961	17327	319	8127	17833
												299	7878	17138

Credit Hours by Major

	2015-16		2016-17		2017-18		2018-19	
	Enrolled	SCH	Enrolled	SCH	Enrolled	SCH	Enrolled	SCH
BIOL								
1. Biology majors	2570	5562	2440	5286	2470	5405	2312	5022
2. Non majors	5255	11282	5434	11780	5626	12335	5566	12020
BIOL Subtotal	7825	16844	7874	17066	8096	17740	7878	17042
ESSL								
1. Biology majors	9	27	5	15	6	18	6	18
2. Non majors	78	234	26	78	26	78	26	78
ESSL Subtotal	87	261	31	93	32	96	32	96
Biological Sciences Totals								
1. Biology majors	2570	5562	2449	5313	2475	5420	2318	5040
2. Non majors	5255	11282	5512	12014	5652	12413	5592	12098
Grand Total	7825	16844	7961	17327	8127	17833	7910	17138

Credit Hours by Faculty

	2014-15			2015-16			2016-17			2017-18			2018-19		
	CCH	SCH	Head cnt	CCH	SCH	Head cnt	CCH	SCH	Head cnt	CCH	SCH	Head cnt	CCH	SCH	Head cnt
BIOL															
T/TT	316	7816	49% 13	365	8521	51% 15	365	9368	55% 16	356	9538	54% 14	333	10630	62% 16
FT NonTT	110	4180	26% 5	119	4243	25% 5	114	3333	20% 5	112	3966	22% 5	144	4371	26% 7
PT	116	3894	25% 13	108	4080	24% 12	114	4365	26% 13	126	4236	24% 13	65	2041	12% 8
BIOL Subtotal	542	15890	31	592	16844	32	593	17066	34	594	17740	32	542	17042	31
ESSL															
T/TT															
FT NonTT															
ESSL Subtotal															
Department Totals															
T/TT	316	7816	49% 13	365	8521	51% 15	371	9536	55% 16	359	9631	54% 14	336	10726	63% 16
FT NonTT	110	4180	26% 5	119	4243	25% 5	117	3426	20% 5	112	3966	22% 5	144	4371	26% 7
PT	116	3894	25% 13	108	4080	24% 12	114	4365	25% 13	126	4236	24% 13	65	2041	12% 8
Grand Total	542	15890	31	592	16844	32	602	17327	34	597	17833	32	545	17138	31

Faculty headcount notes: T/TT and FT NonTT are counted once, in the primary subject in which they teach. When there are credit hours shown for a subject but the faculty headcount is 0, that means all faculty teaching in that subject also teach another subject(s) and have been recorded under the other subject.

Part-time faculty are counted once in each subject in which they teach, but are only counted once in the department total.

Ratio of full-time equivalent students (FTES) to full-time equivalent faculty (FTEF)

	2014-15		2015-16		2016-17		2017-18		2018-19	
	FTES	FTEF	FTES	FTEF	FTES	FTEF	FTES	FTEF	FTES	FTEF
BIOL	529.7	22.6	561.5	24.7	568.9	24.7	591.3	24.8	568.1	22.6
ESSL		23.5		22.8	8.7	0.4	3.1	0.1	3.2	0.1
Department Total	529.7	22.6	561.5	24.7	577.6	25.1	594.4	24.9	571.3	22.7

FTES- full-time equivalent student, equal to total student credit hours divided by 30 (the academic year full-time load for students) FTEF- full-time equivalent faculty, equal to total course credit hours divided by 24 (the academic year full-time load for faculty)

Essential Learning Courses

Subject	Course	2014-15		2015-16		2016-17		2017-18		2018-19	
		Sect	Enrolled	SCH	Enrolled	SCH	Enrolled	SCH	Enrolled	SCH	Enrolled
BIOL		Cr Hrs	Sect	Enrolled	SCH	Sect	Enrolled	SCH	Sect	Enrolled	SCH
101	General Human Biology-GTSC1	3	15	1048	3144	15	1021	3063	16	1033	3099
101L	General Human Biol Lab-GTSC1	1	42	1056	1056	42	1050	1050	43	1054	1054
102	Plant/Anim Biodiversity-GTSC1	3	2	70	210	2	97	291			
102L	Plant/Anim Biodivers Lab-GTSC1	1	3	69	69	4	98	98			
105	Attri Living Systems-GTSC1	3	6	264	792	5	268	804	6	250	750
105L	Attri Living Syst Lab-GTSC1	1	12	248	248	11	255	255	12	245	245
108	Diversity of Organisms-GTSC1	3							2	58	174
108L	Diversity of Orgnsmns Lab-GTSC1	1							4	58	58
250	Intro to Microbiology-GTSC1	3	1	23	69	1	21	63	2	94	282
250L	Intro/Microbiology Lab-GTSC1	1-2	1	23	46	1	21	42	4	94	188
BIOL Subtotal			82	2801	5634	81	2831	5666	89	2886	5850
ESSL											
290	Milestone	3							3	87	261
ESSL Subtotal									3	87	261
Biological Sciences Total			82	2801	5634	81	2831	5666	92	2973	6111
									91	3052	6330
									1	31	93
									1	31	93
									91	3014	6048
									1	32	96
									1	32	96
									92	3046	6144

Becktiell	Margot	T/TT	Assoc Professor of Biology
Hampton	Paul	T/TT	Assoc Prof of Bio/Physio
Hansen	Eriek	T/TT	Asst Professor of Biology
Lavelle	Amanda	T/TT	Asst Professor of Biology
McKenney	Denise	T/TT	Professor of Biology
McQuade	Kyle	T/TT	Associate Professor Bio Sci
McVean	Carrie	T/TT	Professor of Biology
Ozsoy Bean	Ayse	T/TT	Asst Professor of Biology
Palmer	Aparna	T/TT	AVPAA Student/ Faculty Success
Sherbenou	Megan	T/TT	Assistant Prof of Biology
Stansbury	Matthew	T/TT	Assistant Professor of Biology
Stern	Stephen	T/TT	Assoc Prof of Biology
Varner	Johanna	T/TT	Asst Professor of Biology
Walla	Thomas	T/TT	Professor of Biology
Weeks	Denita	T/TT	Assistant Prof of Biology
Werman	Steven	T/TT	Professor of Biology
Call	Dale	FT NonTT	Instructor of Biology
Cyr	Tracy	FT NonTT	Instructor of Biology
Good	Rence	FT NonTT	Instructor of Biology
Kornkven	Amy	FT NonTT	Biology Lab Instructor
Matlock	Stephanie	FT NonTT	Instructor of Biology
Sitota	Judith	FT NonTT	Instructor of Biology
West	Shay	FT NonTT	Instructor of Biology
Gathart	Matthew	PT	Lecturer of Biology

Gromke	George	PT	Lecturer of Biology
Harper	Valerie	PT	Lecturer of Biology
McLaughlin	Pamela	PT	Lecturer of Biology
Scott	Melissa	PT	Lecturer of Biology
Sellers	Andrea	PT	Lecturer of Biology
Spangrude	Gerald	PT	Lecturer of Biology
Wouters	Russell	PT	Lecturer of Kinesiology

Only includes faculty who are listed as primary instructor of record for a course taught in summer 2016, fall 2016, or spring 2017. Faculty who were on sabbatical or on leave for the entire year may therefore be omitted, even if they were still on the payroll.

In some cases (such as clinical instructors or teachers of applied music lessons) an instructor might not be the instructor of record for any course and might therefore be omitted from this list. Typically, this would only apply to part-time faculty.

Appendix B

MFT and PRAXIS Results

Summary of MFT Test Data 2014-2019

	F14-F15	F15	S16	F16	S17	F17	S18	F18	S19	Combined
Total Test Score Average	151	151		150	154	150	152	154	151	152
Standard Deviation	13	12		9	12	11	12	10	8	9
Count	59	17		31	52	21	60	18	39	57

DEPARTMENTAL SUMMARY OF TOTAL TEST AND SUBSCORES

Test: Biology
 Form Code: 4KMF
 Institution: Colorado Mesa University
 Cohort: **Fall 2014-Fall 2015** - Biology ne
 Closed on: October 16, 2015

TOTAL TEST		
Scaled Score Range	Number in Range	Percent Below
200	0	100
195-199	0	100
190-194	0	100
185-189	0	100
180-184	1	98
175-179	1	97
170-174	0	97
165-169	6	86
160-164	5	78
155-159	13	55
150-154	7	43
145-149	7	31
140-144	7	19
135-139	2	16
130-134	5	7
125-129	3	2
120-124	1	0

		Subscore 1		Subscore 2		Subscore 3		Subscore 4	
		Cell Biology		Molecular Biology and Genetics		Organismal Biology		Population Biology, Evolution and Ecology	
Scaled Score Range	Number in Range	Percent Below	Number in Range	Percent Below	Number in Range	Percent Below	Number in Range	Percent Below	
100	0	100	0	100	0	100	0	100	
95-99	0	100	0	100	0	100	0	100	
90-94	0	100	0	100	0	100	0	100	
85-89	0	100	0	100	0	100	1	98	
80-84	0	100	0	100	0	100	0	98	
75-79	2	97	2	97	3	95	1	97	
70-74	2	93	2	93	1	93	1	95	
65-69	5	84	4	86	4	86	6	84	
60-64	5	76	10	69	7	74	6	74	
55-59	13	53	10	52	8	60	5	66	
50-54	10	36	8	38	8	47	10	48	
45-49	3	31	6	28	9	31	5	40	
40-44	3	26	7	16	8	17	6	29	
35-39	10	9	2	12	6	7	6	19	
30-34	3	3	6	2	0	7	3	14	
25-29	1	2	1	0	3	2	6	3	
20-24	1	0	0	0	1	0	2	0	

	Mean	Standard Deviation
Total Test Scaled Score	151	13
Subscore 1	52	12
Subscore 2	53	13
Subscore 3	51	12
Subscore 4	49	15

Students responding to less than 50% of the questions: **1**
 Students in frequency distribution: **58**
 Students tested: **59**

DEPARTMENTAL SUMMARY OF TOTAL TEST AND SUBSCORES

Test: Biology
 Form Code: 4KMF
 Institution: Colorado Mesa University
 Cohort: **Fall 2015** - Biology
 Closed on: December 08, 2015

TOTAL TEST		
Scaled Score Range	Number in Range	Percent Below
200	0	100
195-199	0	100
190-194	0	100
185-189	0	100
180-184	0	100
175-179	0	100
170-174	1	94
165-169	1	88
160-164	2	76
155-159	2	65
150-154	3	47
145-149	4	24
140-144	2	12
135-139	1	6
130-134	0	6
125-129	1	0
120-124	0	0

		Subscore 1		Subscore 2		Subscore 3		Subscore 4	
		Cell Biology		Molecular Biology and Genetics		Organismal Biology		Population Biology, Evolution and Ecology	
Scaled Score Range	Number in Range	Percent Below	Number in Range	Percent Below	Number in Range	Percent Below	Number in Range	Percent Below	
100	0	100	0	100	0	100	0	100	
95-99	0	100	0	100	0	100	0	100	
90-94	0	100	0	100	0	100	0	100	
85-89	0	100	0	100	0	100	0	100	
80-84	0	100	0	100	0	100	0	100	
75-79	0	100	0	100	1	94	0	100	
70-74	1	94	1	94	0	94	1	94	
65-69	2	82	1	88	0	94	0	94	
60-64	1	76	2	76	5	65	5	65	
55-59	1	71	2	65	1	59	1	59	
50-54	5	41	2	53	2	47	1	53	
45-49	4	18	3	35	3	29	5	24	
40-44	2	6	4	12	3	12	1	18	
35-39	1	0	1	6	1	6	1	12	
30-34	0	0	1	0	0	6	0	12	
25-29	0	0	0	0	1	0	0	12	
20-24	0	0	0	0	0	0	2	0	

	Mean	Standard Deviation
Total Test Scaled Score	151	12
Subscore 1	52	9
Subscore 2	51	11
Subscore 3	52	12
Subscore 4	50	14

Students responding to less than 50% of the questions: **0**
 Students in frequency distribution: **17**
 Students tested: **17**

DEPARTMENTAL SUMMARY OF TOTAL TEST AND SUBSCORES

Test: Biology
 Form Code: 4KMF
 Institution: Colorado Mesa University
 Cohort: **Spring 2016** Biology
 Closed on: May 02, 2016

TOTAL TEST		
Scaled Score Range	Number in Range	Percent Below
200	0	100
195-199	0	100
190-194	0	100
185-189	0	100
180-184	0	100
175-179	4	92
170-174	1	90
165-169	3	84
160-164	8	69
155-159	11	47
150-154	6	35
145-149	10	16
140-144	3	10
135-139	3	4
130-134	1	2
125-129	1	0
120-124	0	0

		Subscore 1		Subscore 2		Subscore 3		Subscore 4	
		Cell Biology		Molecular Biology and Genetics		Organismal Biology		Population Biology, Evolution and Ecology	
Scaled Score Range	Number in Range	Percent Below	Number in Range	Percent Below	Number in Range	Percent Below	Number in Range	Percent Below	
100	0	100	0	100	0	100	0	100	
95-99	0	100	0	100	0	100	0	100	
90-94	0	100	0	100	0	100	0	100	
85-89	0	100	1	98	1	98	0	100	
80-84	1	98	1	96	0	98	0	100	
75-79	1	96	4	88	1	96	2	96	
70-74	5	86	5	78	1	94	2	92	
65-69	3	80	2	75	7	80	0	92	
60-64	6	69	5	65	4	73	11	71	
55-59	6	57	11	43	8	57	10	51	
50-54	14	29	6	31	11	35	9	33	
45-49	10	10	7	18	8	20	4	25	
40-44	1	8	5	8	3	14	5	16	
35-39	4	0	1	6	2	10	3	10	
30-34	0	0	2	2	5	0	1	8	
25-29	0	0	0	2	0	0	4	0	
20-24	0	0	1	0	0	0	0	0	

	Mean	Standard Deviation
Total Test Scaled Score	155	12
Subscore 1	56	11
Subscore 2	57	14
Subscore 3	53	12
Subscore 4	52	12

Students responding to less than 50% of the questions: **0**
 Students in frequency distribution: **51**
 Students tested: **51**

DEPARTMENTAL SUMMARY OF TOTAL TEST AND SUBSCORES

Test: Biology
 Form Code: 4KMF
 Institution: Colorado Mesa University
 Cohort: **Fall 2016** Biology
 Closed on: December 21, 2016

TOTAL TEST			Subscore 1		Subscore 2		Subscore 3		Subscore 4		
Scaled Score Range	Number in Range	Percent Below	Cell Biology		Molecular Biology and Genetics		Organismal Biology		Population Biology, Evolution and Ecology		
			Scaled Score Range	Number in Range	Percent Below	Number in Range	Percent Below	Number in Range	Percent Below	Number in Range	Percent Below
200	0	100	100	0	100	0	100	0	100	0	100
195-199	0	100	95-99	0	100	0	100	0	100	0	100
190-194	0	100	90-94	0	100	0	100	0	100	0	100
185-189	0	100	85-89	0	100	0	100	0	100	0	100
180-184	0	100	80-84	0	100	0	100	0	100	0	100
175-179	0	100	75-79	0	100	0	100	0	100	0	100
170-174	0	100	70-74	2	94	2	94	0	100	1	97
165-169	2	94	65-69	3	84	0	94	1	97	2	90
160-164	3	84	60-64	2	77	4	81	5	81	3	81
155-159	6	65	55-59	1	74	5	65	6	61	5	65
150-154	5	48	50-54	7	52	9	35	5	45	5	48
145-149	7	26	45-49	4	39	3	26	6	26	6	29
140-144	5	10	40-44	3	29	3	16	5	10	2	23
135-139	2	3	35-39	7	6	2	10	3	0	6	3
130-134	1	0	30-34	1	3	3	0	0	0	0	3
125-129	0	0	25-29	1	0	0	0	0	0	1	0
120-124	0	0	20-24	0	0	0	0	0	0	0	0

	Mean	Standard Deviation
Total Test Scaled Score	150	9
Subscore 1	49	12
Subscore 2	51	11
Subscore 3	51	8
Subscore 4	51	11

Students responding to less than 50% of the questions: **0**
 Students in frequency distribution: **31**
 Students tested: **31**

DEPARTMENTAL SUMMARY OF TOTAL TEST AND SUBSCORES

Test: Biology
 Form Code: 4KMF
 Institution: Colorado Mesa University
 Cohort: **Spring 2017** Biology
 Closed on: May 11, 2017

TOTAL TEST			Subscore 1			Subscore 2		Subscore 3		Subscore 4	
Scaled Score Range	Number in Range	Percent Below	Cell Biology			Molecular Biology and Genetics		Organismal Biology		Population Biology, Evolution and Ecology	
			Scaled Score Range	Number in Range	Percent Below	Number in Range	Percent Below	Number in Range	Percent Below	Number in Range	Percent Below
200	0	100	100	0	100	0	100	0	100	0	100
195-199	0	100	95-99	0	100	0	100	0	100	0	100
190-194	0	100	90-94	0	100	0	100	0	100	0	100
185-189	0	100	85-89	0	100	0	100	0	100	0	100
180-184	0	100	80-84	0	100	0	100	0	100	0	100
175-179	1	98	75-79	3	94	4	92	2	96	0	100
170-174	3	92	70-74	6	83	4	85	3	91	0	100
165-169	5	83	65-69	6	72	1	83	4	83	6	89
160-164	11	62	60-64	2	68	10	64	11	62	11	68
155-159	6	51	55-59	7	55	3	58	8	47	5	58
150-154	8	36	50-54	10	36	10	40	9	30	13	34
145-149	4	28	45-49	7	23	10	21	1	28	1	32
140-144	7	15	40-44	2	19	3	15	9	11	10	13
135-139	6	4	35-39	7	6	0	15	3	6	3	8
130-134	2	0	30-34	2	2	6	4	3	0	4	0
125-129	0	0	25-29	1	0	1	2	0	0	0	0
120-124	0	0	20-24	0	0	1	0	0	0	0	0

	Mean	Standard Deviation
Total Test Scaled Score	154	12
Subscore 1	54	13
Subscore 2	53	14
Subscore 3	54	11
Subscore 4	52	10

Students responding to less than 50% of the questions: **0**
 Students in frequency distribution: **53**
 Students tested: **53**

DEPARTMENTAL SUMMARY OF TOTAL TEST AND SUBSCORES

Test: Biology
 Form Code: 4KMF
 Institution: Colorado Mesa University
 Cohort: Biology Fall 2107
 Closed on: March 26, 2018

TOTAL TEST		
Scaled Score Range	Number in Range	Percent Below
200	0	100
195-199	0	100
190-194	0	100
185-189	0	100
180-184	0	100
175-179	0	100
170-174	1	95
165-169	0	95
160-164	2	86
155-159	4	67
150-154	5	43
145-149	2	33
140-144	3	19
135-139	3	5
130-134	1	0
125-129	0	0
120-124	0	0

	Subscore 1		Subscore 2		Subscore 3		Subscore 4	
	Cell Biology		Molecular Biology and Genetics		Organismal Biology		Population Biology, Evolution and Ecology	
Scaled Score Range	Number in Range	Percent Below	Number in Range	Percent Below	Number in Range	Percent Below	Number in Range	Percent Below
100	0	100	0	100	0	100	0	100
95-99	0	100	0	100	0	100	0	100
90-94	0	100	0	100	0	100	0	100
85-89	0	100	0	100	0	100	0	100
80-84	0	100	0	100	0	100	0	100
75-79	0	100	1	95	0	100	0	100
70-74	0	100	1	90	0	100	0	100
65-69	2	90	2	81	2	90	1	95
60-64	1	86	1	76	1	86	1	90
55-59	3	71	4	57	4	67	5	67
50-54	5	48	4	38	4	48	5	43
45-49	5	24	3	24	3	33	2	33
40-44	2	14	1	19	4	14	2	24
35-39	1	10	2	10	3	0	3	10
30-34	1	5	2	0	0	0	2	0
25-29	0	5	0	0	0	0	0	0
20-24	1	0	0	0	0	0	0	0

	Mean	Standard Deviation
Total Test Scaled Score	150	11
Subscore 1	49	10
Subscore 2	53	12
Subscore 3	51	9
Subscore 4	49	10

Students responding to less than 50% of the questions: **0**
 Students in frequency distribution: **21**
 Students tested: **21**

DEPARTMENTAL SUMMARY OF TOTAL TEST AND SUBSCORES

Test: Biology
 Form Code: 4KMF
 Institution: Colorado Mesa University
 Cohort: Biology Spring 2018
 Closed on: May 10, 2018

TOTAL TEST		
Scaled Score Range	Number in Range	Percent Below
200	0	100
195-199	0	100
190-194	0	100
185-189	1	98
180-184	1	97
175-179	1	95
170-174	2	92
165-169	6	82
160-164	5	73
155-159	4	67
150-154	12	47
145-149	12	27
140-144	7	15
135-139	8	2
130-134	0	2
125-129	1	0
120-124	0	0

		Subscore 1		Subscore 2		Subscore 3		Subscore 4	
		Cell Biology		Molecular Biology and Genetics		Organismal Biology		Population Biology, Evolution and Ecology	
Scaled Score Range	Number in Range	Percent Below	Number in Range	Percent Below	Number in Range	Percent Below	Number in Range	Percent Below	
100	0	100	0	100	0	100	0	100	
95-99	0	100	0	100	0	100	0	100	
90-94	0	100	0	100	0	100	0	100	
85-89	0	100	0	100	0	100	1	98	
80-84	1	98	2	97	1	98	0	98	
75-79	3	93	0	97	2	95	3	93	
70-74	2	90	1	95	0	95	3	88	
65-69	5	82	2	92	5	87	5	80	
60-64	5	73	6	82	13	65	7	68	
55-59	4	67	12	62	7	53	3	63	
50-54	8	53	9	47	10	37	12	43	
45-49	12	33	8	33	5	28	14	20	
40-44	6	23	11	15	8	15	4	13	
35-39	9	8	4	8	7	3	2	10	
30-34	4	2	3	3	1	2	4	3	
25-29	1	0	1	2	1	0	1	2	
20-24	0	0	1	0	0	0	1	0	

	Mean	Standard Deviation
Total Test Scaled Score	152	12
Subscore 1	51	13
Subscore 2	51	12
Subscore 3	53	11
Subscore 4	53	13

Students responding to less than 50% of the questions: **0**
 Students in frequency distribution: **60**
 Students tested: **60**

DEPARTMENTAL SUMMARY OF TOTAL TEST AND SUBSCORES

Test: Biology
 Form Code: K-4KMF
 Institution: Colorado Mesa University
 Cohort: Biology Fall 2018
 Closed on: December 10, 2018

TOTAL TEST		
Scaled Score Range	Number in Range	Percent Below
200	0	100
195-199	0	100
190-194	0	100
185-189	0	100
180-184	0	100
175-179	0	100
170-174	0	100
165-169	3	83
160-164	4	61
155-159	4	39
150-154	0	39
145-149	3	22
140-144	2	11
135-139	1	6
130-134	1	0
125-129	0	0
120-124	0	0

		Subscore 1		Subscore 2		Subscore 3		Subscore 4	
		Cell Biology		Molecular Biology and Genetics		Organismal Biology		Population Biology, Evolution and Ecology	
Scaled Score Range	Number in Range	Percent Below	Number in Range	Percent Below	Number in Range	Percent Below	Number in Range	Percent Below	
100	0	100	0	100	0	100	0	100	
95-99	0	100	0	100	0	100	0	100	
90-94	0	100	0	100	0	100	0	100	
85-89	0	100	0	100	0	100	0	100	
80-84	0	100	0	100	0	100	0	100	
75-79	0	100	0	100	0	100	1	94	
70-74	1	94	1	94	0	100	0	94	
65-69	1	89	2	83	2	89	5	67	
60-64	1	83	3	67	4	67	2	56	
55-59	0	83	5	39	1	61	2	44	
50-54	6	50	5	11	6	28	2	33	
45-49	5	22	0	11	0	28	2	22	
40-44	0	22	2	0	2	17	1	17	
35-39	4	0	0	0	3	0	1	11	
30-34	0	0	0	0	0	0	1	6	
25-29	0	0	0	0	0	0	1	0	
20-24	0	0	0	0	0	0	0	0	

	Mean	Standard Deviation
Total Test Scaled Score	154	10
Subscore 1	49	10
Subscore 2	56	8
Subscore 3	52	11
Subscore 4	55	14

Students responding to less than 50% of the questions: **0**
 Students in frequency distribution: **18**
 Students tested: **18**

DEPARTMENTAL SUMMARY OF TOTAL TEST AND SUBSCORES

Test: Biology
 Form Code: K-4KMF
 Institution: Colorado Mesa University
 Cohort: Biology Spring 2019
 Closed on: May 15, 2019

TOTAL TEST		
Scaled Score Range	Number in Range	Percent Below
200	0	100
195-199	0	100
190-194	0	100
185-189	0	100
180-184	0	100
175-179	0	100
170-174	1	97
165-169	2	92
160-164	3	85
155-159	5	72
150-154	12	41
145-149	8	21
140-144	6	5
135-139	2	0
130-134	0	0
125-129	0	0
120-124	0	0

Subscore 1			Subscore 2		Subscore 3		Subscore 4	
Cell Biology			Molecular Biology and Genetics		Organismal Biology		Population Biology, Evolution and Ecology	
Scaled Score Range	Number in Range	Percent Below	Number in Range	Percent Below	Number in Range	Percent Below	Number in Range	Percent Below
100	0	100	0	100	0	100	0	100
95-99	0	100	0	100	0	100	0	100
90-94	0	100	0	100	0	100	0	100
85-89	0	100	0	100	0	100	0	100
80-84	0	100	1	97	0	100	1	97
75-79	0	100	3	90	0	100	0	97
70-74	2	95	1	87	1	97	0	97
65-69	2	90	1	85	1	95	1	95
60-64	3	82	6	69	6	79	1	92
55-59	7	64	7	51	4	69	5	79
50-54	5	51	8	31	14	33	13	46
45-49	12	21	1	28	4	23	9	23
40-44	3	13	7	10	3	15	3	15
35-39	3	5	2	5	5	3	3	8
30-34	1	3	2	0	1	0	3	0
25-29	1	0	0	0	0	0	0	0
20-24	0	0	0	0	0	0	0	0

	Mean	Standard Deviation
Total Test Scaled Score	151	8
Subscore 1	51	10
Subscore 2	54	12
Subscore 3	51	9
Subscore 4	50	10

Students responding to less than 50% of the questions: **0**
 Students in frequency distribution: **39**
 Students tested: **39**

DEPARTMENTAL SUMMARY OF TOTAL TEST AND SUBSCORES

Test: **Biology**
 Form Code: K-4KMF
 Institution: Colorado Mesa University
 Cohort: **Combined**
 Closed on: Combined

TOTAL TEST		
Scaled Score Range	Number in Range	Percent Below
200	0	100
195-199	0	100
190-194	0	100
185-189	0	100
180-184	0	100
175-179	0	100
170-174	1	98
165-169	5	89
160-164	7	77
155-159	9	61
150-154	12	40
145-149	11	21
140-144	8	7
135-139	3	2
130-134	1	0
125-129	0	0
120-124	0	0

		Subscore 1		Subscore 2		Subscore 3		Subscore 4	
		Cell Biology		Molecular Biology and Genetics		Organismal Biology		Population Biology, Evolution and Ecology	
Scaled Score Range	Number in Range	Percent Below	Number in Range	Percent Below	Number in Range	Percent Below	Number in Range	Percent Below	
100	0	100	0	100	0	100	0	100	
95-99	0	100	0	100	0	100	0	100	
90-94	0	100	0	100	0	100	0	100	
85-89	0	100	0	100	0	100	0	100	
80-84	0	100	1	98	0	100	1	98	
75-79	0	100	3	93	0	100	1	96	
70-74	3	95	2	89	1	98	0	96	
65-69	3	89	3	84	3	93	6	86	
60-64	4	82	9	68	10	75	3	81	
55-59	7	70	12	47	5	67	7	68	
50-54	11	51	13	25	20	32	15	42	
45-49	17	21	1	23	4	25	11	23	
40-44	3	16	9	7	5	16	4	16	
35-39	7	4	2	4	8	2	4	9	
30-34	1	2	2	0	1	0	4	2	
25-29	1	0	0	0	0	0	1	0	
20-24	0	0	0	0	0	0	0	0	

	Mean	Standard Deviation
Total Test Scaled Score	152	9
Subscore 1	50	10
Subscore 2	55	11
Subscore 3	51	9
Subscore 4	51	12

Students responding to less than 50% of the questions: **0**
 Students in frequency distribution: **57**
 Students tested: **57**

Summary of MFT Assessment Indicators: **Analytical Skills** 2014-2019

	F14-F15	F15	S16	F16	S17	F17	S18	F18	S19	Combined
Mean % Correct	42	44	45	43	46	42	46	49	44	45

DEPARTMENTAL SUMMARY OF ASSESSMENT INDICATORS

Test: Biology

Form Code: 4KMF

Institution: Colorado Mesa University

Cohort: **Fall 2014-Fall 2015** - Biology ne

Closed on: October 16, 2015

Assessment Indicator Number	Assessment Indicator Title	Mean Percent Correct
1	Biochemistry and Cell Energetics	42
2	Cellular Structure, Organization, Function	45
3	Molecular Biology and Molecular Genetics	44
4	Diversity of Organisms	53
5	Organismal - Animals	39
6	Organismal - Plants	38
7	Population Genetics and Evolution	40
8	Ecology	44
9	Analytical Skills	42

Students responding to less than 50% of the questions: **1**

Students in frequency distribution: **58**

Students tested: **59**

DEPARTMENTAL SUMMARY OF ASSESSMENT INDICATORS

Test: Biology

Form Code: 4KMF

Institution: Colorado Mesa University

Cohort: **Fall 2015** - Biology

Closed on: December 08, 2015

Assessment Indicator Number	Assessment Indicator Title	Mean Percent Correct
1	Biochemistry and Cell Energetics	47
2	Cellular Structure, Organization, Function	43
3	Molecular Biology and Molecular Genetics	42
4	Diversity of Organisms	55
5	Organismal - Animals	39
6	Organismal - Plants	40
7	Population Genetics and Evolution	39
8	Ecology	46
9	Analytical Skills	44

Students responding to less than 50% of the questions: **0**

Students in frequency distribution: **17**

Students tested: **17**

DEPARTMENTAL SUMMARY OF ASSESSMENT INDICATORS

Test: Biology

Form Code: 4KMF

Institution: Colorado Mesa University

Cohort: **Spring 2016** Biology

Closed on: May 02, 2016

Assessment Indicator Number	Assessment Indicator Title	Mean Percent Correct
1	Biochemistry and Cell Energetics	47
2	Cellular Structure, Organization, Function	50
3	Molecular Biology and Molecular Genetics	49
4	Diversity of Organisms	54
5	Organismal - Animals	41
6	Organismal - Plants	41
7	Population Genetics and Evolution	42
8	Ecology	48
9	Analytical Skills	45

Students responding to less than 50% of the questions: **0**

Students in frequency distribution: **51**

Students tested: **51**

DEPARTMENTAL SUMMARY OF ASSESSMENT INDICATORS

Test: Biology

Form Code: 4KMF

Institution: Colorado Mesa University

Cohort: Fall 2016 Biology

Closed on: December 21, 2016

Assessment Indicator Number	Assessment Indicator Title	Mean Percent Correct
1	Biochemistry and Cell Energetics	42
2	Cellular Structure, Organization, Function	40
3	Molecular Biology and Molecular Genetics	42
4	Diversity of Organisms	50
5	Organismal - Animals	39
6	Organismal - Plants	38
7	Population Genetics and Evolution	45
8	Ecology	42
9	Analytical Skills	43

Students responding to less than 50% of the questions: **0**

Students in frequency distribution: **31**

Students tested: **31**

DEPARTMENTAL SUMMARY OF ASSESSMENT INDICATORS

Test: Biology

Form Code: 4KMF

Institution: Colorado Mesa University

Cohort: **Spring 2017** Biology

Closed on: May 11, 2017

Assessment Indicator Number	Assessment Indicator Title	Mean Percent Correct
1	Biochemistry and Cell Energetics	46
2	Cellular Structure, Organization, Function	48
3	Molecular Biology and Molecular Genetics	45
4	Diversity of Organisms	57
5	Organismal - Animals	41
6	Organismal - Plants	41
7	Population Genetics and Evolution	44
8	Ecology	45
9	Analytical Skills	46

Students responding to less than 50% of the questions: **0**

Students in frequency distribution: **53**

Students tested: **53**

DEPARTMENTAL SUMMARY OF ASSESSMENT INDICATORS

Test: Biology

Form Code: 4KMF

Institution: Colorado Mesa University

Cohort: Biology **Fall 2107**

Closed on: March 26, 2018

Assessment Indicator Number	Assessment Indicator Title	Mean Percent Correct
1	Biochemistry and Cell Energetics	40
2	Cellular Structure, Organization, Function	41
3	Molecular Biology and Molecular Genetics	43
4	Diversity of Organisms	51
5	Organismal - Animals	40
6	Organismal - Plants	36
7	Population Genetics and Evolution	42
8	Ecology	41
9	Analytical Skills	42

Students responding to less than 50% of the questions: **0**

Students in frequency distribution: **21**

Students tested: **21**

DEPARTMENTAL SUMMARY OF ASSESSMENT INDICATORS

Test: Biology

Form Code: 4KMF

Institution: Colorado Mesa University

Cohort: Biology **Spring 2018**

Closed on: May 10, 2018

Assessment Indicator Number	Assessment Indicator Title	Mean Percent Correct
1	Biochemistry and Cell Energetics	42
2	Cellular Structure, Organization, Function	44
3	Molecular Biology and Molecular Genetics	41
4	Diversity of Organisms	56
5	Organismal - Animals	41
6	Organismal - Plants	39
7	Population Genetics and Evolution	45
8	Ecology	46
9	Analytical Skills	46

Students responding to less than 50% of the questions: **0**

Students in frequency distribution: **60**

Students tested: **60**

DEPARTMENTAL SUMMARY OF ASSESSMENT INDICATORS

Test: Biology

Form Code: K-4KMF

Institution: Colorado Mesa University

Cohort: Biology **Fall 2018**

Closed on: December 10, 2018

Assessment Indicator Number	Assessment Indicator Title	Mean Percent Correct
1	Biochemistry and Cell Energetics	37
2	Cellular Structure, Organization, Function	44
3	Molecular Biology and Molecular Genetics	46
4	Diversity of Organisms	58
5	Organismal - Animals	40
6	Organismal - Plants	38
7	Population Genetics and Evolution	46
8	Ecology	51
9	Analytical Skills	49

Students responding to less than 50% of the questions: **0**

Students in frequency distribution: **18**

Students tested: **18**

DEPARTMENTAL SUMMARY OF ASSESSMENT INDICATORS

Test: Biology

Form Code: K-4KMF

Institution: Colorado Mesa University

Cohort: Biology **Spring 2019**

Closed on: May 15, 2019

Assessment Indicator Number	Assessment Indicator Title	Mean Percent Correct
1	Biochemistry and Cell Energetics	40
2	Cellular Structure, Organization, Function	45
3	Molecular Biology and Molecular Genetics	44
4	Diversity of Organisms	56
5	Organismal - Animals	40
6	Organismal - Plants	36
7	Population Genetics and Evolution	38
8	Ecology	46
9	Analytical Skills	44

Students responding to less than 50% of the questions: **0**

Students in frequency distribution: **39**

Students tested: **39**

DEPARTMENTAL SUMMARY OF ASSESSMENT INDICATORS

Test: Biology

Form Code: K-4KMF

Institution: Colorado Mesa University

Cohort: **Combined**

Closed on: Combined

Assessment Indicator Number	Assessment Indicator Title	Mean Percent Correct
1	Biochemistry and Cell Energetics	39
2	Cellular Structure, Organization, Function	44
3	Molecular Biology and Molecular Genetics	45
4	Diversity of Organisms	56
5	Organismal - Animals	40
6	Organismal - Plants	37
7	Population Genetics and Evolution	41
8	Ecology	47
9	Analytical Skills	45

Students responding to less than 50% of the questions: **0**

Students in frequency distribution: **57**

Students tested: **57**

Biology Secondary Teaching 5 Year Praxis Data.xlsx

Student Identifier	Level	Content	Praxis II Code	Praxis II Score -182 Cut Score-	Graduated	Category1 (Points Earned/ Points Available)	Category2 (Points Earned/ Points Available)	Category3 (Points Earned/ Points Available)	Category4 (Points Earned/ Points Available)	Category5 (Points Earned/ Points Available)	Category6 (Points Earned/ Points Available)	edTPA Points
Spring '14 Student 1	Secondary	Biology, Teacher Certification	5435	163	5/15/2014	ND	ND	ND	ND	ND	ND	ND
Spring '15 Student 1	Secondary	Biology, Teacher Certification	5435	173	5/14/2015	ND	ND	ND	ND	ND	ND	ND
Spring '16 Student 1	Secondary	Biology, Teacher Certification	5435	160	5/12/2016	ND	ND	ND	ND	ND	ND	ND
Spring '16 Student 2	Secondary	Biology, Teacher Certification	5435	169	5/12/2016	12	12	15	22	17	22	6
Spring '17 Student 1	Secondary	Biology, Teacher Certification	5435	179	5/12/2016	10	12	34	42	37	22	18
Spring '17 Student 2	Secondary	Biology, Teacher Certification	5435	200 (E)	5/11/2017	11	12	40	42	22	21	11
Fall '17 Student 1	Secondary	Biology, Teacher Certification	5435	183 (E)	12/14/2017	8	12	19	42	13	22	14
Fall '17 Student 2	Secondary	Biology, Teacher Certification	5435	183 (E)	12/14/2017	11	12	34	42	21	22	11
Spring '18 Student 1	Secondary	Biology, Teacher Certification	5435	155	5/10/2018	10	12	18	42	12	22	11
Fall '19 Student 1	Secondary	Biology, Teacher Certification	5435	TBA	Anticipated 12/13/2019	ND	ND	ND	ND	ND	ND	12
Fall '19 Student 2	Secondary	Biology, Teacher Certification	5435	174	Anticipated 12/13/2019	10	12	39	42	21	22	10
Spring '20 Student 1	Secondary	Biology, Teacher Certification	5435	TBA	Anticipated 5/16/2020	ND	ND	ND	ND	ND	ND	12

1. Science, Mathematics, History, and Social Studies 1135
 2. Physical Science 365
 3. Life Science 208
 4. ESE 208
 5. Content, Technology, and Safety 208
 edTPA Points Available

1135 365 208 208 1135
 edTPA implemented after CTE score review in 2017

ND = no data
 (E) = excellent score at national level

About edTPA: https://www.edtpa.com/PageView.aspx?ID=GEN_aboutedtpa.html

Semesters Without Data	
Fall 2012	no students
Spring 2013	no students
Fall 2013	no students
Fall 2015	no students
Fall 2016	no students
Fall 2018	no students

References for Praxis Exam, **General Science - Content Knowledge (5435)**
 2014 - 2015 Praxis Performance: https://www.ets.org/s/praxis/pdf/typs_1415.pdf
 2015 - 2016 Praxis Performance: https://www.ets.org/s/praxis/pdf/typs_1516.pdf
 2016 - 2017 Praxis Performance: https://www.ets.org/s/praxis/pdf/typs_1617.pdf
 2017 - 2018 Praxis Performance: https://www.ets.org/s/praxis/pdf/typs_1718.pdf
 2018 - 2019 Praxis Performance: https://www.ets.org/s/praxis/pdf/typs_1819.pdf
 Curriculum Crosswalks from ETS: https://www.ets.org/s/praxis/doc/crosswalk_5435.docx
 Praxis 5435 Categories & Study Plan: https://www.ets.org/s/praxis/doc/studyplan_5435.docx
 Nebraska Dept of Ed Crosswalk: <https://doe.education.ne.gov/assets/content/uploads/2017/07/Gen-5435.pdf>

Prior Students Who Took Different Content Exams

Student Identifier	Level	Content	Praxis/ PLACE Code	Exam Score
Spring '12 Student 1	Secondary	Biology, Teacher Certification	0435	182
Fall '13 Student 1	Secondary	Biology, Teacher Certification	12/12/2013 PLACE 05	206
Fall '13 Student 2	Secondary	Biology, Teacher Certification	12/12/2013 PLACE 05	176

Prior Exam Key

0435	Prior Praxis version of exam - General Science: Content Knowledge Science [05]	5/6/2017 - date discontinued
	https://www.ets.org/s/praxis/doc/crosswalk_5435.docx	https://www.ets.org/s/praxis/doc/studyplan_5435.docx



COLORADO

Department of
Higher Education

1740 Franklin, Suite 1600
Denver, CO 80202

John Hovenshield
Governor

Dr. Kim Weaver Reed
Executive Director

September 19, 2017

Dr. Cynthia Pemberton
Colorado Mesa University

Re: Reauthorization of Educator Preparation Unit at Colorado Mesa University

Dear Dr. Pemberton:

I am pleased to inform you that at its September 12, 2017 meeting, the Colorado Commission on Higher Education reauthorized the educator preparation unit at Colorado Mesa University.

This reauthorization aligns with 29-1-121(4)(a)(ii), Colorado Revised Statutes, which states *The department, in conjunction with the Department of Education, shall review each educator preparation program offered by an institution of higher education as provided in paragraph (b) of this subsection (4) and shall establish a schedule for review of each educator preparation program that ensures each program is reviewed as provided in this section not more frequently than once every five years.*

As you are aware, the Colorado Department of Higher Education appreciates all the efforts of Colorado Mesa University's faculty and staff in the reauthorization process. We are hopeful that the feedback provided by the reauthorization team is both constructive and beneficial to the educator preparation unit.

Please do not hesitate to contact me with any questions regarding the reauthorization process, or if I can be of any additional assistance.

Sincerely,

Dr. Ian K. Macgillivray
Director of Academic Affairs
ian.macgillivray@che.state.co.us
303-662-3008





COLORADO
Department of Education

Educator Talent
6900 East Evans Avenue, Building #2, Suite 100
Denver, CO 80222

Dr. Blake Bickham
Department Head and Associate Professor
Colorado Mesa University
1100 North Avenue
Grand Junction, CO 81501

May 24, 2017

Dear Dr. Bickham:

At its meeting on May 11, 2017, the Colorado State Board of Education voted to reauthorize the preparation programs offered by Colorado Mesa University. Congratulations!

The State Board determined that the content of Colorado Mesa University's preparation programs in Principal, Elementary Education, Visual Arts, English Language Arts, World Languages, Mathematics, Music, Physical Education, Science, Social Studies, Culturally and Linguistically Diverse Education, Special Education Generalist, and Early Childhood Education Special Education meet the requirements with regard to reauthorization of preparation programs as specified in C.R.S. 22-2-112, C.R.S. 22-1-109, and in the Rules for the Administration of the Educator Licensing Act of 1993.

Thank you for your leadership in providing multiple pathways to prepare candidates who meet the educational needs of Colorado's students.

Sincerely,

Colleen O'Neil, Ed.D.
Executive Director, Educator Talent
Colorado Department of Education

cc: Janet Lear, Ph.D., Educator Development Specialist, Educator Talent: CDE
Mary Bivens, Director of Educator Development, Educator Talent: CDE
Robert Mitchell, Ph.D., Academic Policy Officer for Educator Preparation: DHE

6900 E. Evans Avenue, Building #2, Suite 100, Denver, CO 80222 P: 303-865-6628
Katy Arthos, Ph.D., Commissioner of Education | www.cde.state.co.us



Appendix C

Faculty Curriculum Vitae

CURRICULUM VITAE

Margot C. Becktel, Ph.D.
Department of Biological Sciences
Colorado Mesa University
Grand Junction, Colorado 81501
970-248-1892
mbecktel@coloradomesa.edu

EDUCATION

Ph.D. in Plant Pathology, Cornell University, 2005

Minors: Plant Physiology and Horticulture

Dissertation: The Host-Pathogen Interactions and Epidemiological Implications of the *Petunia x hybrida*, *Calibrachoa x hybridus* and *Nicotiana benthamiana* Late Blight Systems

B.S. Biology with a minor in Chemistry, Mesa State College, 1998 (magna cum laude)

TEACHING

Teaching Experience:

Fall 2015 – Present: Associate Professor of Biology

2008 – Spring 2015: Assistant Professor of Biology

Department of Biological Sciences, Colorado Mesa University, Grand Junction, CO

2005 - 2008: Instructor of Biology

Department of Biological Sciences, Mesa State College, Grand Junction, CO

2001: Graduate teaching assistant

Department of Plant Pathology, Cornell University, Ithaca, NY

Plant Pathology 241 Lab: Plant diseases and disease management

Received “Golden Apple” teaching award - outstanding teaching assistant, 2001-2002 academic year

Traditional Classroom Courses Taught and Experiential Courses Supervised:

SUPP 101 (FYI) Introduction to Higher Education

BIOL 101, 101L General Human Biology

BIOL 105, 105L Attributes of Living Systems

BIOL 107, 107L Principles of Plant Biology

ESSL 290 Milestone: Numbers and Patterns in Nature

BIOL 387 Structured Research

BIOL 395 Independent Study

BIOL 396 Topics: Horticulture

BIOL 421, 421L Plant Physiology

BIOL 423, 432L Plant Anatomy

BIOL 450, 450L Mycology

BIOL 482 Senior Research

BIOL 483 Senior Thesis

BIOL 487 Advanced Research

BIOL 493 Lab Teaching Practicum

BIOL 495 Independent Study

BIOL 499 Internship

Innovative Teaching Materials/Activities:

- Use of the CMU Writing Center for feedback on student drafts in Senior Thesis (BIOL 483)
- Integrate a “library lab day” for Principles of Plant Biology Lab (BIOL 107L) to allow for more instructor interaction while students searched for primary literature articles for their writing assignment (in an effort to reinforce the concept of primary vs. secondary literature).
- Incorporation of peer-to-peer interactions in Senior Thesis (BIOL 483) to get students talking about their writing process and a reflection assignment to get students writing about their writing.
- Development of worksheets for General Human Biology Lab (BIOL 101L) in an effort to reduce the time spent lecturing in lab.
- Use of real life challenges faced by local growers (orchards, vineyards, greenhouses) as the basis for student driven experiments in Plant Physiology Lab (BIOL 421L)
- Use of Jeopardy style reviews in Principles of Plant Biology (BIOL 107) and General Human Biology (BIOL 101).
- “What Will You Notice” assignment in Plant Biology Lab (BIOL 107L)
- Use of PeerMark via Turnitin in Senior Thesis (BIOL 483), Milestone (ESSL 290) and Principles of Plant Biology Lab (BIOL 107L).
- Use of the Top Hat student engagement app in Principles of Plant Biology Lecture (BIOL 107)
- Plant life cycle drawing assignments in Principles of Plant Biology Lecture and the “Botany Wall of Fame” (BIOL 107)
- “Unknown Plant” group projects and poster presentations in Principles of Plant Biology Lab (BIOL 107L)
- Community interview projects and presentations in Horticulture topics course (BIOL 396)
- Plant Anatomy Portfolios in Plant Anatomy Lab (BIOL 423L)
- Class Facebook page for Plant Anatomy Lab (BIOL 423L)
- “Moldy Minds” student blog for Mycology Lecture (BIOL 450)
- Local mycological collection assignment in Mycology Lab (BIOL 450L)
- Student directed discussions of primary literature in all upper division courses.

Evidence of Continuous Improvement:

August 16th, 2019.

Co-facilitated a Faculty Professional Development workshop on advising, *Finding your Way as an Advisor*.

Attended a Faculty Professional Development workshop on Information Literacy facilitated by Ms. Anne Bledsoe, Ms. Dee Chambers, Dr. Erika Jackson, Dr. Megan Henley and Dr. Bill Wright.

Attended refresher sessions on D2L, Degree Works and CRM Advise

January 18th, 2019. Catharyn Baird

Everyone Teaches Ethics: Strategies for Embracing the Inevitable

September 19, 2018. Teacher 2 Teacher

Co-facilitated two sessions: *Using Peer Review for Writing* and *Efficient Assessment of Writing*

October 22nd, 2018. CMU Campus In-Service Training.

Wellness Training – Bob Lang, Director of Diversity, Advocacy and Health, CMU and Ann Lee Walker

August 17th, 2018. Faculty Professional Development workshop on Leadership facilitated by Dr. Kristen Hague and Dr. Brenda Wilhelm.

April 6th, 12th and 17th, 2018. CMU Campus In-Service trainings.

Inclusive and Supportive Culture – Dr. Nita Mosby Tyler

Campus Safety – Dr. John Nicoletti

Title IX and Sexual Harassment – Jill Knuckles and John Marshall

- February 21st, 2018. Teacher 2 Teacher
Elevate Writing at CMU.
- January 12th, 2018. Dr. Elizabeth Long Lingo.
Creativity in teaching.
- January 12th, 2017. Dr. Donna Beegle.
Morning keynote session, *Breaking the Iron Cage of Poverty: Tools for Increasing Educational Success*.
The interactive afternoon session, *Communicating and Relating More Effectively with Students who Live in the Crisis of Poverty*
- August 18th, 2017: Professional Development Session A: *How do we know we know, and, once we know, what do we do with it?* facilitated by Suzanne Lay and Bette Shans; Session D: *Developing Your Leadership Groove at CMU* facilitated by Aparna Palmer, Morgan Bridge and Chad Middleton.
- November 11th, 2016: Dr. Nita Mosby Tyler
Diversity and Inclusion
- November 8th, 2016: John Marshall, VP of Student Services
Title IX
- October 26, 2016: Bob Lang, Director of Diversity, Advocacy and Health, CMU
Mental Health and Suicide Prevention
- October 12, 2016: Teacher 2 Teacher
Faculty Feud
- August 19, 2016: Dr. Linda Nilson
Critical Thinking Unmasked workshop with
- January 15, 2016: CMU Panel Discussion/Workshop
Professionalism and Classroom Management Strategies, Effective Constructive Criticism, and Dealing with Volatile Students
- November 18, 2015: Milestone Workshop
- November 17, 2015: Teacher 2 Teacher
“Academic Speed Dating” for Milestone matchup ideas
- April 10, 2015: Leslie Myers
Work-Life Balance Workshop
- February 17, 2015: Teacher 2 Teacher
“How to set a Milestone Course into Motion”
- April 1, 2014: Teacher 2 Teacher
“What works for me?”
- January 16, 2014: Dr. Terry Rhodes, VP or AAC&U
VALUE Rubrics and Interdisciplinary Capstone Courses

November 20, 2014: Teacher 2 Teacher
"What do you do when...?"

January 10-11, 2013: Paul Gaston, Kent State University
General Education Workshop

August 15-16, 2012: Ken Bain
"What all the Best Professors Do" teaching workshop

October 15, 2013: Dr. Mark Taylor
Engaging NeXt generation students

January 5 - 6, 2012: Paul Gaston, Kent State University
The Degree Qualifications Profile

May 20, 2011: Cengage Learning
SUP 101/FYI workshop/training sessions

October 18, 2011: Sonia Brandon, Colorado Mesa University
Learning and Study Strategies Inventory (LASSI) Implementation

January 13 - 14, 2011: Jessica Herrick, Colorado Mesa University
Revitalizing General Education and Program Assessment

May 21, 2010: Cengage Learning
SUP 101/FYI workshop/training session

January 15 - 16, 2009: Barbara Millis, University of Nevada - Las Vegas
Linking Classroom Assessment Techniques to the Research on How People Learn
Using Groups and Academic Games for Learning and Assessment
Course Redesign Revitalization

May 19, 2009: Nancy Conklin and Kristyn Rose, Mesa State College
Universal Design for Learning workshop.

May 22, 2009: Cengage Learning
Supp 101/FYI workshop/training session

May 1 - 2, 2008: Ed Neal, University of North Carolina
Designing Courses that Promote Critical Thinking
Teaching Critical Thinking: Active Learning
Evaluating Critical Thinking
Classroom Management: Dealing with Difficulties

October 21, 2008: "How to Create an Inclusive Environment: It all begins with you!"

Fall 2008
Faculty colloquium on use of i>clickers in the classroom

RESEARCH AND SCHOLARLY ACTIVITIES

Research Experience:

2009-Present: Undergraduate Research Mentor
Colorado Mesa University

2005 – 2012: Research Associate
Colorado Department of Agriculture's Insectary, Palisade, Colorado

1999 – 2004: Graduate Research Assistant; Ph.D. Candidate
Department of Plant Pathology, Cornell University, Ithaca, NY

1998: Undergraduate Research Assistant
Biology and Chemistry Departments, Mesa State College, Grand Junction, CO

1998: Undergraduate Research Assistant
La Selva Biological Research Station, Costa Rica

Research Projects and Undergraduate Students Mentored at Colorado Mesa University:

Fall 2017 –Present: Project aimed at the identification of fungi present on cadavers that have been decomposing in a high desert climate. The project is in collaboration with CMU's Forensic Investigation Research Station (FIRS). Research Students: Selina Tucker.

Fall 2011-Present: Continuation of dissertation research to identify a zoospore lysing substance produced by petunias. Undergraduate Research Students: Emily (Breiner) Schulze, Kiley DeSanto, Nathan Stevenson, Jessica Hartney, Chandler Baldwin, Katherina Burkett, Justin Blaskowsky, Chris Walker, Hadleigh Wailes, Elijah Columbia, Kayla Murphy and Louis Torres.

Fall 2018. Undergraduate presentation by Elijah Columbia for the 2018 SRI/CMU Summer Internship Program in Biological Research (SIPBR). Presentation titled "THE INTERACTIONS OF SUCROSE ESTERS FROM VARIOUS SOLANACEOUS PLANTS WITH ZOOSPORES OF PHYTOPHTHORA INFESTANS".

Spring 2018. Undergraduate research poster presentation by Elijah Columbia and Kayla Murphy at the spring 2018 CMU Student Showcase. Poster titled "AN EXPLORATION INTO THE MODE OF ACTION OF SUCROSE ESTERS AGAINST ZOOSPORES OF *PHYTOPHTHORA INFESTANS*".

Spring 2016: Undergraduate research poster presentation by Justin Blaskowsky. Poster titled "PURIFICATION, SEPARATION AND BIOCHEMICAL ANALYSIS OF ZOOSPORICIDAL AGENTS FROM *PETUNIA X HYBRIDA*".

Spring 2016: Undergraduate research poster presentation by Katherina Burkett. Poster titled "TESTING THE SENSITIVITY OF *PHYTOPHTHORA INFESTANS* TO SUCROSE MONOLAURATE VIA DISC AND AGAR DIFFUSION METHODS".

Spring 2016: Undergraduate research poster presentation by Christopher Walker. Poster titled "BEHAVIORAL CHARACTERISTICS OF *PHYTOPHTHORA INFESTANS* ZOOSPORES ON THE LEAF SURFACE OF VARIABLY SUSCEPTIBLE HOSTS".

Spring 2015: Undergraduate research poster presentation by Chandler Baldwin at the CMU Student Showcase. Poster titled "Comparison between the zoospore lysing activity of pure sucrose esters and petunia leaf extracts."

Summer 2014: Co-presented undergraduate research poster presentation with Jessica Hartney at the annual meeting of the American Phytopathological Society. Poster titled “The biochemistry of an extract with zoosporicidal activity from late blight infected *Petunia x hybrida*.”

Spring 2013: Undergraduate research poster presentation by Jessica Hartney and Nathan Stevenson at the CMU Student Showcase. Poster titled “Investigations into a zoospore lysing agent made from petunia late blight lesions”. AWARDED first place for poster session.

Spring 2011: Optimization of *Puccinia acroptili* inoculum production under growth chamber conditions. Undergraduate Research Student: Katherine Sams

Spring 2011: FulvicBloom™/Bio- Microbial Bloom™ foliar application comparison experiment on Micro-Tom tomatoes. Undergraduate Research Student: James Crass

Summer 2011: Analysis of Brix levels in sugar beet cotyledons in response to fulvic acid applications using Fulvic Bloom™. Undergraduate Research Student: Chris Reinertsen

Summer 2011: Determination of the effectiveness of the rust fungus *Puccinia acroptili* as a potential biological control for the invasive species *Acroptilon repens* (Russian knapweed) under field conditions at the Horsethief Bench area. Undergraduate Research Student: Jessica Hartney

Spring-Summer 2009: Determination of the pathogenicity of a naturally occurring isolate of the soil-borne pathogen *Rhizoctonia* on greenhouse grown *Euphorbia esula* (Leafy Spurge), a noxious, invasive weed in Colorado. Undergraduate Research Student: Alex Randolph-Lowe

Peer-Reviewed Publications:

Bruckart, III, W. L., Eskandary, F. M., Beckett, M. C., Bean, D., Littlefield, J., Pilgeram, A.L., Sands, D. C., Aime, M.C. 2006. *Puccinia acroptili* on Russian knapweed in Colorado, Montana, and Wyoming. Plant Disease 90:971.

Beckett, M. C., Daughtrey, M. L. and Fry, W. E. 2005. Epidemiology and management of petunia and tomato late blight in the greenhouse. Plant Disease 89:1000-1008.

Beckett, M. C., Daughtrey, M. L. and Fry, W. E. 2005. Temperature and leaf wetness requirements for pathogen establishment, incubation period and sporulation of *Phytophthora infestans* on *Petunia x hybrida*. Plant Disease 89:975-979.

Beckett, M. C., Smart, C. D., Haney, C. H. and Fry, W. E. 2005. Host-pathogen interactions between *Phytophthora infestans* and the solanaceous hosts *Calibrachoa x hybridus*, *Petunia x hybrida* and *Nicotiana benthamiana*. Plant Disease 90:24-32.

Published Abstracts:

Beckett, M. C. 2016. Putative sucrose esters from *Petunia x hybrida* may contribute to this host's reduced susceptibility to *Phytophthora infestans*.

<http://www.apsnet.org/meetings/annual/abstracts/pages/abstractdetail.aspx?MID=741>

Beckett, M. C. 2014. The biochemistry of an extract with zoosporicidal activity from late blight infected *Petunia x hybrida*. http://www.apsnet.org/meetings/Documents/2014_meeting_abstracts/aps2014abP141.htm

Beckett, M. C. and Fry, W. E. 2012. Zoospore lysis occurs in sporangial suspensions made from petunia late blight lesions. http://www.apsnet.org/meetings/Documents/2012_Meeting_Abstracks/aps12abP98.htm

Becktell, M. C., Daughtrey, M. L. and Fry, W. E. 2003. Temperature and moisture requirements for establishment, incubation period, latent period and sporulation of *Phytophthora infestans* on petunia. *Phytopathology* 93(6):S7.

Rathbone*, M.C., Smart, C. D and Fry, W. E. 2001. Isolates of *Phytophthora infestans* that infect *Petunia × hybrida* and *Nicotiana benthamiana* also produce INF1. *Phytopathology* 92(6): S145.

* Maiden name

Online Publications:

Online Guide to the Flora of Mesa County/Flora Database, Co-authored with Dr. Deb Kennard, Dr. Carrie McVean Waring, Dr. Kristy Duran, <http://www.coloradomesa.edu/flora/index.html>

Trade Journal Articles:

Becktell, M. C., Daughtrey, M. L. and Fry, W. E. 2003. Beware of Late Blight on Petunias and Tomatoes. *Greenhouse Business*. June 2003: 31-32

Daughtrey, M. and Becktell, M. 2002. Scary *Phytophthoras*. *Grower Talks*. September 2002: 90, 92.

Extension Publications:

Becktell, M. C., Daughtrey, M. L. and Fry, W. E. (2002). *Petunia* late blight, an emerging disease? Focus on Floriculture, Cornell University. Volume 1, No. 2

Lab Manual:

BIOL 107L Principles of Plant Biology Laboratory Manual, 2014. Colorado Mesa University, Grand Junction, CO. (Co-Authored with Dr. Stephen Stern)

Presentations and Posters:

2016: Presented a poster at the 2016 annual meeting of the American Phytopathological Society titled "Putative sucrose esters from *Petunia x hybrida* may contribute to this host's reduced susceptibility to *Phytophthora infestans*."

2014: Co-Presented a poster with student Jessica Hartney at the 2014 annual meeting of the American Phytopathological Society titled "The biochemistry of an extract with zoosporicidal activity from late blight infected *Petunia x hybrida*.". Also presented this poster at a special "Poster Huddle" session (by invitation only) titled "What was the most important discovery about *Phytophthora* this year?".

2012: Poster presentation at the 2012 annual meeting of the American Phytopathological Society titled "Zoospore Lysis Occurs In Sporangial Suspensions Made From *Petunia* Late Blight Lesions".

2008: Presentation of research on biological control of leafy spurge at the Upper Colorado Environmental Plant Center Training Session in Meeker, Colorado.

2003: Poster presented to the American Floral Endowment at the Long Island Horticultural Research and Extension Center at the 2003 "Cornell Floriculture Open House and Field Day" titled "Petunia late blight a Typhoid Mary?"

2003: Presentation at the annual meeting of the American Phytopathological Society titled "Temperature and moisture requirements for establishment, incubation period, latent period and sporulation of *Phytophthora infestans* on petunia."

2003: Presentation at the Ohio Florists' Association Short Course titled "Late blight – beware the petunias".

2001: Presentation at the annual meeting of the Northeast Division of the American Phytopathological Society titled "Isolates of *Phytophthora infestans* that infect *Petunia x hybrida* and *Nicotiana benthamiana* also produce INF1."

Grant/Funding Proposals:

September, 2019. Colorado Mesa University Faculty Professional Development proposal to fund travel to the annual meeting of the American Phytopathological Society meeting and to pay for petunia sucrose ester purification supplies and sample analyses costs, and to pay for supplies and sequencing fees for the FIRS fungus ID project. \$1612 requested.

December, 2018. CMU Department of Biological Sciences Travel funds proposal to partially fund travel to Bogotá, Colombia as part of my sabbatical. \$900 requested. **FUNDED**

August, 2018. Colorado Mesa University Faculty Professional Development proposal to pay for supplies to purify petunia sucrose ester extracts. \$350 requested. **FUNDED**

August, 2018. Colorado Mesa University Faculty Professional Development proposal to partially fund travel to Bogotá, Colombia as part of my sabbatical. \$600 requested. \$300 granted **PARTIALLY FUNDED**

February, 2018. CMU Department of Biological Sciences Travel funds to travel to the 2018 International Congress of Plant Pathologists/American Phytopathological Society meeting. \$1500 requested. **FUNDED**

August, 2017. Colorado Mesa University Faculty Professional Development Proposal to pay for supplies to filter and test bioactivity of leaf extracts from various petunia cultivars, two wild petunia species, a wild potato species and a wild tomato species. \$870 requested. **FUNDED**

August, 2016. Colorado Mesa University Faculty Professional Development Proposal to pay for supplies and biochemical analyses of petunia extracts at UC Santa Cruz. \$900 requested. **FUNDED**

January, 2016. Co-PI on NSF-MRI Proposal resubmission to fund the purchase of an ELSD LC-MS system. PI Dr. Kimberly White, CMU Chemistry Department. \$363,793. **NOT FUNDED**

October, 2015. CMU Department of Biological Sciences Travel funds to travel to the 2016 annual meeting of the American Phytopathological Society. \$1476 requested. **FUNDED**

August, 2015. Colorado Mesa University Faculty Professional Development Proposal for travel to the 2016 annual meeting of the American Phytopathological Society. \$1,255.00 requested. \$879 **FUNDED**

August, 2015. Colorado Mesa University Faculty Professional Development Proposal to pay for biochemical analyses of petunia extracts at UC Santa Cruz. \$600 requested. **FUNDED**

January, 2015. Co-PI on NSF-MRI Proposal resubmission to fund the purchase of an ELSD LC-MS system. PI Dr. Kimberly White, CMU Chemistry Department. \$299,643. **NOT FUNDED** (Was ranked as Good, Very Good/Good, and Very Good/Good by reviewers)

August, 2014. Colorado Mesa University Faculty Professional Development Proposal to pay for biochemical analyses of petunia extracts at UC Santa Cruz. \$600 requested. **FUNDED**

January, 2014. Co-PI on an Equipment Grant proposal to Shimadzu Scientific Instruments toward the purchase of a Shimadzu High Performance LC/MS/MS System. \$130,000. **FUNDED** (Purchase of the LC/MS/MS is contingent on securing additional funds from NSF or another source).

January, 2014. Co-PI on NSF-MRI Proposal to fund the purchase of an ELSD LC-MS system. PI Dr. Kimberly White, CMU Chemistry Department. \$358,663. **NOT FUNDED**. (Was ranked as Good, Very Good and Excellent by reviewers).

September, 2013. Colorado Mesa University Faculty Professional Development Proposal to pay for biochemical analyses of petunia extracts performed at UC Santa Cruz, and for the purchase of equipment and supplies to perform Glucose phosphate isomerase isozyme analysis of *Phytophthora infestans* isolates being maintained in my research lab. \$1,618 requested. **FUNDED**

September, 2013. CMU Department of Biological Sciences Undergraduate Research Fund Proposal for purchase of supplies to perform Glucose phosphate isomerase (GPI) isozyme analysis of *Phytophthora infestans* isolates being maintained in my research lab. \$379 requested. **FUNDED** (an additional \$740 requested and funded to cover an item that was misquoted from Helena Labs for running GPI gels).

September, 2013. Colorado Mesa University Faculty Professional Development Proposal for travel to the 2014 annual meeting of the American Phytopathological Society. \$1,355.00 requested. \$1,084.00 **FUNDED**

October, 2013. CMU Department of Biological Sciences Travel funds to travel to the 2014 annual meeting of the American Phytopathological Society. \$1,355 requested. \$1,200 **FUNDED**

September, 2011. Colorado Mesa University Faculty Professional Development Proposal for purchase of a 9 cu. ft. growth chamber to maintain research cultures of *Phytophthora infestans*. \$3,000 requested. **FUNDED**

September, 2011 Colorado Mesa University Faculty Professional Development Proposal for travel to the 2011 annual meeting of the American Phytopathological Society. \$1,655 requested. \$1,241 **FUNDED**

September, 2011. CMU Department of Biological Sciences Undergraduate Research Fund Proposal for purchase of supplies to grow and maintain isolates of *Phytophthora infestans*. \$394 requested. **FUNDED**

August, 2011. CMU Department of Biological Sciences Travel funds to travel to the 2012 annual meeting of the American Phytopathological Society. \$1,014 requested. **FUNDED**

September, 2010 Mesa State College Faculty Professional Development Proposal for continued work on "Flora of Mesa County". \$2,400 requested. \$2,040 **FUNDED**

September, 2009 Mesa State College Faculty Professional Development Proposal for development of a "Flora of Mesa County" website. \$3,000 requested. **FUNDED**

September, 2009 NSF-S-STEM scholarship program proposal to encourage student success in biological sciences at MSC titled "Students Mentoring Students in Biology Scholarship Program. \$165,000 requested, **NOT FUNDED**

September, 2007 White River Habitat Partnership Program (Rio Blanco County, Colorado) proposal titled "Development and implementation of a biologically based management plan for leafy spurge in Colorado". \$19,680 requested. \$10,000 **FUNDED**

January, 2007 EPA grant proposal titled "Optimizing the biological control of leafy spurge in Colorado through an integrated pest management program". \$50,900. **NOT FUNDED**

January, 2007 USDA-NRCS-CIG grant proposal title "Development and implementation of a biologically based management plan for leafy spurge in Colorado". \$201,631. **FUNDED**

August, 2005 USDA-NRCS-CIG grant proposal title "Optimizing Leafy Spurge Biological Control in Colorado". \$71,200. **FUNDED**

Supervised Internships and Independent Studies:

Spring 2006 - Present: Greenhouse Management and Curation Internships or Independent Study. Two students per semester and one or two in the summers. Students gain experience with the everyday workings of an educational greenhouse and work on various assignments, including development of informational labels for plants and informational posters on the pests and pest control strategies used in the greenhouse. Supervision of two students every semester, including summers (~ 60 students to date).

Spring 2019: Faculty Supervisor for Alexandra Chavez's internship at Comfort Dental Vail Valley where she helped with and followed a case involving a dental implant for one of the patients.

Summer 2018: Faculty Supervisor for Teresa Giandonato's summer internship with the National Oceanic and Atmospheric Administration (NOAA) studying the lipid contents of sand lance on Stellwagen Bank National Marine Sanctuary in Massachusetts Bay.

Fall 2017: Faculty Supervisor for Reba DayWinder's Independent Study. The Marvels of Mycology educational display in Wubben Science by Reba DayWinder.

Summer 2017: Faculty Supervisor for two summer internships. Jessica Ruiz interned at the St. Mary's Hospital lab facility and Brian Arms interned at the District 8 cannabis grow facility in DeBeque, Colorado.

Summer 2015/Fall 2015: Faculty Supervisor for three summer/fall internships. Austin Hadley interned at the CDA Insectary in Palisade, Brandon Adams interned at the Grand Valley Mosquito Control District, and Kelsey Sloan interned with Redstone Veterinary Hospital.

Fall 2014: Faculty Supervisor for Emily Maryanski's internship shadowing Chandra Kluk, PA-C at Grand Valley Urgent Care (Community Hospital).

Summer 2013: Faculty Supervisor for Evan Cunningham's internship at the CSU Agronomy Research Station, Fruita, Colorado. Exploration of various plants as a source of biofuel.

Spring 2013: Faculty Supervisor for Kait Holt's internship at Amigo Animal Hospital, Grand Junction, Colorado. Involved in the everyday activities of the animal hospital.

Summer 2012: Faculty Supervisor for Kait Holt's internship at the Kualoa Ranch Hawaii, Inc., Oahu, Hawaii. Involved in the everyday activities/maintenance of the ranch.

Spring 2012: Faculty Supervisor for Vanessa Stone's internship at Amigo Animal Hospital, Grand Junction Colorado. Involved in the everyday activities of the animal hospital.

Spring-Summer 2011: Faculty Supervisor for Cambri Crow and Lorraine Cooper during the initial development stages of the "Flora of Mesa County" Website at Mesa State College.

Summer 2008: Faculty Supervisor for Melissa Hart's internship at the Colorado Department of Ag – Insectary in Palisade, Colorado. Biological control of bindweed.

Spring 2007: Faculty Supervisor for Estephen Cordova's internship at the Colorado Department of Ag – Insectary in Palisade, Colorado. Biological pest control of toadflax and bindweed.

Spring 2006: Faculty Supervisor for Michael Shideler's internship at the Colorado Department of Ag – Insectary in Palisade, Colorado. Biological control of cereal leaf beetle.

Manuscripts Reviewed:

August, 2016. Reviewed Plant Disease Manuscript ID PDIS-07-16-0980-RE. Resistance to *Phytophthora infestans* in tomato wild relatives. Arafa, R. A., Mossa, O. M., Soliman, N. K., Shirasawa, K., Kamel, S. M., and Rakha, M. T.

February, 2014. As a Senior Editor for Plant Health Instructor, reviewed and oversaw external review of a Plant Health Instructor teaching article titled, Creating an Active Learning Environment with Prepared Slides, and an introductory lab exercise titled, An Active Learning Lab on Ascomycete Reproduction.

March, 2014. Reviewed Phytopathology Manuscript ID PHYTO-03-14-0226. Differential interactions of *Phytophthora capsici* with resistant and susceptible pepper cultivars. Dunn, A. and Smart, S.

January, 2014. Reviewed Weed Research Manuscript ID WRE-2013-0226. Does *Fusarium* –caused seed mortality contribute to *Bromus tectorum* stand failure in the Great Basin? Meyer, S., Franke, J., Baughman, O., Beckstead, J., and Geary, B.

June, 2008. Reviewed Plant Disease Manuscript ID PD-03-08-0134-RE. Identification of *Phytophthora cryptogea* as the cause of Rapid Decline of Petunia in Chile. Latorre.

October, 2007. Second Review of Plant Disease Manuscript ID PD-09-06-0485-RE.R2. The Host Specificity and Tomato-related Race Composition of *Phytophthora infestans* Isolates in Taiwan During 2004 to 2005. Chen.

April, 2006. Reviewed Plant Disease Note ID PD-04-06-0208-PDN. First report of *Phytophthora infestans* on *Petunia × hybrida* in South Africa. McLeod, A.

September, 2006. Reviewed Plant Disease Manuscript ID PD-09-06-0485-RE. The Host Specificity and Tomato-related Race Composition of *Phytophthora infestans* Isolates in Taiwan During 2004 to 2005. Chen.

Professional Memberships:

- American Phytopathological Society
- American Horticulture Society
- Botanical Society of America
- Association of Education and Research Greenhouse Curators
- Tri-Beta Honor Society

SERVICE**Campus Committees:**

Fall 2017 – Member of the Writing Center Fact Finding Committee

Fall 2015 – Fall 2017: Member CMU HLC Criterion 3 Committee (member of the Criterion 3D subcommittee)

Fall 2014 – Spring 2018: Chair, Academic Policies Committee

Fall 2012 – Spring 2014: Academic Policies Committee Member

Spring 2012: Grade Appeals Ad Hoc Committee Member

Fall 2008 – Spring 2012: Faculty Salary and Benefits Committee Member

Spring 2009 - Spring 2012: Curriculum Committee Member

Fall 2008 - Lectures and Forums Committee Member

Search Committees:

Fall 2017-Spring 2018: Chair of Biology Lab Lecturer Search Committee

Spring 2014: Biology Teaching Laboratory Technician Search Committee Member

Fall 2012: Academic Advisor Search Committee Member

Fall 2011 - Spring 2012 - Assistant Professor of Biology: Developmental Biology Search Committee Member

Fall 2010-Spring 2011: Assistant Professor of Biology: Botany Search Committee Chair

Summer 2009: Academic Advisor Search Committee Member

Spring 2008: Medical Surgical Nursing Search Committee Member

Service to Colorado Mesa University:

Fall 2013 – Present: Provide greenery and flowers from the CMU greenhouse for Spring Recognition ceremonies and the inaugural fall Convocation ceremony when possible.

Spring 2013 – Present: Active member of the CMU Tree Advisory Committee to establish CMU as a TreeCampus USA.

Spring 2011-Spring 2012: Partnered with Dr. Aparna Palmer to initiate and help with activities to name the herbarium at CMU the “Walter Almond Kelley Herbarium”.

Fall 2008: Student Recruitment Day

2006 – Present: Manager/Curator of the Wubben Science educational greenhouse facility.

Spring 2005: Moderator for a morning oral presentation session for the Student Scholars Program

Service to Department of Biological Sciences, Colorado Mesa University:

Fall 2018 – Present: Chair Department of Biological Sciences Travel Committee

Fall 2018 – Present: Grants Officer for BIOSINQ

Fall 2018 – Present: Chair of the Biology Graduation Planning Committee

February and November, 2018: Mesa Experience

November 11th, 2017 – Mesa Experience

Fall 2017 – Member of the committee to explore the feasibility of developing a Master’s program in the Biology Department.

March 3rd, 2017 – Presented at the GEMS club “Biology Research Night”.

Spring 2016 – Spring 2017: Chair of the “Pre-Thesis” writing strategy committee that I initiated to explore ideas on how to identify and help biology majors who need extra help/instruction with writing; also involves exploring the feasibility of reestablishing a writing center at CMU.

September 30th, 2016 - Mav Scholars

Spring 2016 - Present: Co-Chair of Biology Graduation Celebration Planning committee (organizing and planning the celebration and pinning ceremony for our graduates each semester).

Spring 2015 - 2016: Chair of Biology Department subcommittee to develop a "Fundamentals of Scientific Communication" course.

March 14 and November, 2015: Mesa Experience

March 24, 2015: Met with and gave a tour of the department to a prospective student-athlete (Ally Faller) and her mother (Juli Faller). I was suggested by the cycling team coach.

September 26, 2015: Took Biology Club on a hike to Wedding Canyon.

Spring 2014: Coordinated meeting to discuss and draft the Ecology, Evolution and Organismal Biology (EEOB) Concentration program sheet.

Fall 2013: Coordinated meeting to discuss and draft an assessment rubric for BIOL 483, Senior Thesis

Spring 2013 – 2015: Member of Biology Department subcommittee to develop tracks/concentrations within the Biology program.

Spring/Fall 2013 – 2015: Member of Biology Department subcommittee to develop discipline specific student learning outcomes (SLOs)

Spring 2012: Coordinated meeting over spring break to draft departmental Student Learning Outcomes (SLOs)

2011: Coordinated and wrote report for the BIOL 101 General Education Assessment

2010: Coordinated and wrote report for the BIOL 101 General Education Assessment

2009 - Present: Wubben Science Courtyard Committee Member

2008 - Present: Biology Travel Committee Member

2007: Coordinated and wrote reports for BIOL 101 General Education Assessment

2006: Coordinated and wrote reports for BIOL 101 General Education Assessment

Service to the Community:

Spring 2019: Junior and Senior Plant Science Judge for Western Colorado Science Fair.

November, 2017: Hosted a group from the Western Colorado Conservation Corps. Gave them a tour and a presentation about plant biology/plant pathology.

Fall 2017: Scientist Mentor for PlantingScience.org – a free online resource for K-12 school teachers to help them explore hands on science projects in their classrooms.

July 2016: Gave a lecture for the Junior Scientist lecture series hosted by the Mesa County Public Library titled “Don’t Get Caught with your Plants Down” on interesting plant diseases encountered in our area.

June 2016: Served as a “STEM Expert” for the Zombie Apocalypse STEM Camp hosted by the CMU Center for Teacher Education.

April 2016: Visited a 4th Grade class at Independence Academy Charter School and taught a short lesson on pollinators, pollination and plant reproduction.

Spring 2016: Finals judge for The Western Colorado Science Fair.

Spring 2015: Finals judge for The Western Colorado Science Fair.

March 23, 2015: Met with Melissa Salter (former student), Air Quality Specialist with the Mesa County Health Department to help her with staining procedures and identification of pollen.

June 2014: Served as a “STEM Expert” for the Zombie Apocalypse STEM Camp hosted by the CMU Center for Teacher Education.

Spring 2014: Helped host ~70 8th graders from local middle schools, an even co-sponsored by the CMU Physics Department and M.E.S.A. Gave group tours of several biology labs and the greenhouse.

Spring 2014: Hosted a field trip to and activity day in the Wubben Science greenhouse facility by the two first grade classes from Independence Academy Charter School (~ 40 children).

Spring 2014: Finals judge for The Western Colorado Science Fair.

Spring 2013: Colorado Canyons Association Nature Scavenger Hunt at Devils Canyon - volunteered at the “Cottonwood Station”; gave a brief talk to groups of grade schoolers and handed out scavenger hunt cards.

Fall 2012: Met with and gave Jeff Nichols, from Mesa Developmental Services, a tour of the greenhouse; discussed options for expansion of the Western Colorado Botanical Gardens.

Fall 2012: Hosted a field trip to and activity day in the Wubben Science greenhouse facility by the two kindergarten classes from Independence Academy Charter School (40 children).

Fall 2012: Helped organize a talk by invited speaker Kathy Doeskin. “Health, Wealth and Compost: Completing the Circle”. Co-sponsored by the CMU Sustainability Council and the CMU Department of Biological Sciences.

Fall 2012: Composed a letter of support on behalf of myself, Dr. Stephen Stern and Dr. Deborah Kennard for the proposed arboretum project at Lincoln Park.

Fall 2012: Volunteered to introduce and describe, on video, a tree for the Lincoln Park Arboretum audio/visual tour project. My assigned tree was the Frontier Elm, *Ulmus ‘Frontier’*.

Spring 2012: Tour of Wubben Science Greenhouse for the Native Plant Society.

Spring 2012: Finals judge for The Western Colorado Science Fair.

November, 2010: Organized travel for and talk by Dr. Mary Beth Hughes from the Science and Technology Policy Institute. “The Science and Policy of Personalized Medicine”. Sponsored by the MSC Chapter of Sigma Xi.

April, 2010: Organized travel for and talk by Dr. Bruce Bugbee from Utah State University. "Living in Space: NASA's Research on Biological Life Support". Co-sponsored by the W. Colorado Math and Science Center, The Colorado Space Grant Consortium, The MSC Chapter of Sigma Xi and the Tri-Beta Honor Society.

February, 2010: Organized travel for and talk by NASA scientist, Mr. David Mains. "Manned Space Flight, Future or Fantasy?". Co-sponsored by the W. Colorado Math and Science Center, the Colorado Space Grant Consortium, and the MSC Chapter of Sigma Xi.

September 13, 2011: Women in Technology, Science and Math Panel Discussion member at the September meeting of the American Association of University Women held in the University Center.

May 24, 2011: Colorado Canyons Association Nature Scavenger Hunt at Devils Canyon - volunteered at the "Cottonwood Station" for the morning session; gave a brief talk to groups of third graders and handed out scavenger hunt cards.

March 24, 2010: "Plants and Soils" presentation/activity for Scenic Elementary School second graders at the Math and Science Center.

Fall 2009: Served as a judge for the Renewable Energy Category of the Conrad Spirit of Innovation Awards Contest; Judged Team "Ramana's"; "GoSolar" system to gather solar energy in residential and agricultural areas.

Fall 2009- Spring 2010: Adult Science Fair Sponsor for two Grand Junction High School students (Kelsey Slauson and Kenna Brown). Helped them develop their project, "Operation Pollination", and supervised some of their experimental work here on campus.

Fall 2009: Attended and served as a consultant at an informational meeting at Grand Junction High School (Ms. Mara McDougal's science class) regarding potential construction of a greenhouse on the high school grounds.

2008, 2010, 2011, facilitated MSC/CMU reservation and organization activities related to the annual Saccomano Lectures co-sponsored by St. Mary's Hospital and the MSC/CMU Chapter of Sigma Xi.

2005, 2006, 2008: Preliminaries judge for the "Botany" category at The Western Colorado Science Fair.

Service to Professional Organizations:

January 2007 – Spring 2016: Senior Editor for Plant Health Instructor, an online resource of plant disease lessons, lab exercises, articles, cases studies and simulations for teachers and professors hosted by the American Phytopathological Society.

Fall 2009 - Spring 2011: President MSC/CMU Chapter of the Sigma Xi Honor Society

Fall 2006-Spring 2009: Vice President MSC Chapter of the Sigma Xi Honor Society

Professional Committees and Activities Prior to Employment at CMU:

2003: APS* Placement Committee

2003: APS* Young Professionals Ad Hoc Committee

2002: Plant Pathology Seminar Committee, Cornell University

2001-2003: New Student Coordinating Committee, Cornell University

2001: Secretary, Cornell Plant Pathology Graduate Student Association

2000: Co-Chair, Cornell Plant Pathology Graduate Student Association

2000: Chair, Cornell Plant Pathology Graduate Student Colloquium

1995-1997: Vice President, Epsilon Omicron Chapter (MSC Chapter), Tri-Beta Biological Honor Society

* APS = American Phytopathological Society

ADVISING

2018

Freshman Orientation Advising Sessions: 2

Individual Advising Sessions: 22

Letters of Recommendation: 16

2017

Freshman Orientation Advising Sessions: 1

Individual Advising Sessions: 30

Letters of Recommendation: 4

2016

Freshman Orientation Advising Sessions: 3

Individual Advising Sessions: 26

Letters of Recommendation: 17

2015

Freshman Orientation Advising Sessions: 2

Individual Advising Sessions: 31

Letters of Recommendation: 12

2014

Freshman Orientation Advising Sessions: 3

Individual Advising Sessions: 28

Letters of Recommendation: 17

2013

Freshman Orientation Advising Sessions: 2

Individual Advising Sessions: 59

Letters of Recommendation: 11

2012 Freshman Orientation Advising Sessions: 3

Individual Advising Sessions: 43

Letters of Recommendation: 7

2011

Freshman Orientation Advising Sessions: 2

Individual Advising Sessions: 31

Letters of Recommendation: 6

2010

Freshman Orientation Advising Sessions: 3

Individual Advising Sessions: 27

Letters of Recommendation: 6

2009

Freshman Orientation Advising Sessions: 4

Individual Advising Sessions: 16

Letters of Recommendation: 7

2008

Freshman Orientation Advising Sessions: 3

Individual Advising Sessions: 13

Letters of Recommendation: 2

2007

Freshman Orientation Advising Sessions: 1

Letters of Recommendation: 1

2006

Freshman Orientation Advising Sessions: 1

Letters of Recommendation: 11

2005

Freshman Orientation Advising Sessions: 1

Honors and Awards

Awarded Sabbatical for Spring 2019

Spring 2013: "Faculty Advisor of the Year" 2013 Maverick Award

Fall 2014: CMU Distinguished Faculty Award Nominee

Honors, Awards and Minor Grants Prior to Employment at CMU

2003: Travel Grant, Cornell University, Ithaca, NY

2003: Thesis Research Grant from The Fred C. Gloeckner Foundation, Inc.

2003: APS Foundation Student Travel Award

2002: Thesis Research Grant from The Fred C. Gloeckner Foundation, Inc.

2001: Travel Grant, Cornell University, Ithaca, NY

2001: Outstanding Teaching Assistant Award, Cornell University, Ithaca, NY

1999 – 2004: Graduate Research Assistantship, Dept. of Plant Pathology, Cornell University, Ithaca, NY

1994, 1997: President's Scholar, Mesa State College, Grand Junction, CO

1995: Scholarship from the American Association of University Women – Amy Lutz Rechel Scholarship.

1993, 96, 97, and 98: Dean's List, Mesa State College, Grand Junction, CO

1993 – 1998: Academic Scholarship, Mesa State College, Grand Junction, CO

Patrice Kurnath Connors, Ph.D.

Adjunct Instructor
School of Biological Sciences, University of Utah, Salt Lake City UT and
Department of Zoology, Weber State University, Ogden UT

Phone: 585-755-1591
patricekurnath.weebly.com
patrice.kurnath@utah.edu

Research Interests: Ecological physiology, mammalogy, climate change biology

Approaches: Integrative biology including field based ecology (i.e., small mammal trapping), lab based physiology (i.e., oxygen consumption, feeding trials), and gene expression techniques (i.e., extractions, primer design, qPCR)

Education

- 2016 **Doctorate of Philosophy**, Biology, University of Utah, Salt Lake City UT
Advisor: M. Denise Dearing
Thesis: Ecological Physiology of Desert Woodrats (*Neotoma lepida*) with respect to Ambient Temperature and Dietary Toxins
- 2006 **Bachelor of Science**, Biology, Ithaca College, Ithaca NY

Academic Positions

- 2018-present **Instructor**, Dept. of Zoology, Weber State University, Ogden UT
Course: Principles of Zoology with lab
- Instructor**, School of Biological Sciences, University of Utah, Salt Lake City UT
Course: Human Physiology Lab, Mammalogy
- 2017-2018 **Visiting Assistant Professor**, Dept. of Zoology, Weber State University
Courses: Principles of Zoology with lab, Ecology with lab, Comparative Physiology with lab, Mammalogy with lab, Animal Biology (non-majors)
- 2017 **Instructor**, Dept. of Zoology, Weber State University
Course: Ecology with lab
- 2016-2017 **Postdoctoral Researcher**, Dept. of Biology, University of Utah
Advisor: M. Denise Dearing
- 2016 **Instructor**, Dept. of Biology, University of Utah
Course: Mammalogy
- 2010-2015 **Graduate Teaching Assistant**, Dept. of Biology, University of Utah
Courses: Comparative Vertebrate Morphology, Evolution and Diversity of Life, Freshman Biology Honors, Mammalogy, Comparative Physiology Lab
- 2010 **Laboratory Manager and Research Associate**, Dept. of Chemistry, UC Berkeley, Berkeley CA
- 2006-2009 **Research Assistant then Laboratory Manager**, Dept. of Neurobiology, Yale University School of Medicine, New Haven CT
- 2006 **Laboratory Technician**, Center for Visual Science, University of Rochester, Rochester NY 2005
Laboratory Technician, Infectious Disease Division, University of Rochester Medical Center, Rochester NY

Publications (*denotes mentored undergraduate student)

5. **Connors, P.K.**, J.R. Malenke and M.D. Dearing. 2017. Ambient temperature-mediated changes in hepatic gene expression of a mammalian herbivore (*Neotoma lepida*). *Molecular Ecology*. 26: 4322-4338. doi: 10.1111/mec.14192
4. Kohl, K.D., M. Samuni-Blank, P. Lymberakis, **P. Kurnath**, I. Izhaki, Z. Arad, W.H. Karasov, and M.D. Dearing. 2016. Effects of fruit toxins on intestinal and microbial β -glucosidase activities of seed-predating and seed-dispersing rodents (*Acomys* spp.). *Physiological and Biochemical Zoology*. (89) 3: 198-205. doi: 10.1086/685546

3. **Kurnath, P**, N.D. Merz*, and M.D. Dearing. 2016. Ambient temperature influenced tolerance to plant secondary compounds in a mammalian herbivore. *Proceedings of the Royal Society B*. (283) 1822. doi: 10.1098/rspb.2015.2387
2. **Kurnath, P**, and M.D. Dearing. 2013. Warmer ambient temperatures depress liver function in a mammalian herbivore. *Biology Letters*. (9) 5. doi: 10.1098/rsbl.2013.0562
1. Samuni-Blank, M., I. Izhaki, M.D. Dearing, W.H. Karasov, Y. Gerchman, K.D. Kohl, P. Lymberakis, **P. Kurnath**, and Z. Arad. 2013. Physiological and behavioural effects of fruit toxins on seed-predating versus seed-dispersing congeneric rodents. *Journal of Experimental Biology*. (216) 3667-73. doi: 10.1242/jeb.089664

Coming Manuscripts

Hoagstrom, C., L. Xiang, N. Lewis-Rogers, **P.K. Connors**, A. Sessions-Robinson, J. Mull. *Accepted*. An advanced simulation of coevolution using playing cards. *The American Biology Teacher*.

Beale, P., **P.K. Connors**, K. Ford, M.D. Dearing, W.J. Foley. *Submitted*. Reduced hepatic detoxification in marsupial herbivores following moderate heat exposure. *Functional Ecology*.

Connors, P.K., M. Giles*, J.S. Ruff, and M.D. Dearing. *In preparation*. Mammalian herbivore use of microclimates when challenged by dietary plant toxins. *Physiology and Behavior*.

Fellowship Awards

- | | |
|-----------|---|
| 2015-2016 | Graduate Research Fellowship, University of Utah Graduate School, \$17,000 stipend and tuition waiver |
| 2015 | East Asia & Pacific Summer Institutes Fellowship, co-funded by National Science Foundation, \$5,000 stipend (USD), round-trip travel from Utah to Washington D.C. and round-trip travel from Utah to Australia; and by the Australian Academy of Science, \$3,200 living expenses (AUD) |
| 2011-2013 | GK-12 Think Globally Learn Locally Graduate Fellowship, National Science Foundation and University of Utah, \$30,000 stipend and tuition waiver for two years |

Research Grants

- | | |
|------|---|
| 2014 | Graduate Student Grant-in-Aid of Research, Global Change & Sustainability Center, University of Utah, \$2,902 |
| 2012 | Grant-in-Aid of Research, Society of Integrative and Comparative Biology, \$920 |
| 2011 | Graduate Student Grant-in-Aid of Research, Global Change & Sustainability Center, University of Utah, \$2,670 |
| | Grant-in-Aid of Research, American Society of Mammalogists, \$1,500 |

Honors & Awards

- | | |
|-----------------|---|
| 2017-2018 | Early Career Travel Award, American Society of Mammalogists, \$700 each year 2017 Postdoctoral Travel Award, Graduate School, University of Utah, \$500 |
| | Travel Award, Evolutionary Impacts of Seasonality Symposium, Society for Integrative and Comparative Biology Conference, \$300 |
| 2016 | George R. Riser Award for Outstanding Graduate Research, Dept. of Biology, University of Utah |
| 2011-2015 | Student Travel Award, Dept. of Biology, University of Utah, \$400 each year |
| 2012-2013, 2015 | Student Travel Award, Graduate School, University of Utah, \$400 each year |
| 2013-2014, 2016 | Student Travel Award, Society for Integrative and Comparative Biology, covered hotel costs or registration fees for 5-day long conference |
| 2014 | Student Travel Award, Global Change & Sustainability Center, University of Utah, \$500 |
| 2006 | Bernard Scholarship for research, Ithaca College |
| 2003-2006 | Dean Scholarship for academics, Ithaca College |

Professional Memberships

Society for Integrative and Comparative Biology (SICB)

American Society of Mammalogists (ASM)

Conference Presentations

- 2018 **Connors, PK**, PK Beale, KJ Marsh, MD Dearing and WJ Foley. ASM, Manhattan KS.
 Connors, PK, JE Light, BP Tanis, JA Drew, CN Anderson and K Hinde. ASM, Manhattan KS.
 Lanier, HC, JS Brown, **PK Connors**, L Dizney, JM Duggan, LP Erb, EA Flaherty, J Hanson, J Varner and CJ Yahnke (presented by J Hanson). ASM, Manhattan KS.
 Duggan, JM, JS Brown, **PK Connors**, L Dizney, LP Erb, EA Flaherty, J Hanson, HC Lanier, J Varner and CJ Yahnke (presented by JM Duggan). ASM, Manhattan KS.
- 2017 **Connors, PK**, M Giles and MD Dearing. ASM, Moscow ID.
 Kurnath, P, P Beale, K Ford, WJ Foley and MD Dearing. SICB, New Orleans LA.
- 2016 **Kurnath, P**, ND Merz and MD Dearing. SICB, Portland OR. 2014 **Kurnath, P** and MD Dearing. SICB, Austin TX.
- 2013 **Kurnath, P** and MD Dearing. SICB, San Francisco CA.
 Samuni-Blank, M, I Izahaki, MD Dearing, WH Karasov, KD Kohl, P Lymberakis, **P Kurnath**, and Z Arad (presented by M Samuni-Blank). SICB, San Francisco CA.
- 2012 **Kurnath, P** and MD Dearing. Society for Experimental Biology, Salzburg, Austria.

Selected Conference Posters (full list on request)

- 2017 Giles, M, **P Kurnath** and MD Dearing (presented by M Giles). SICB, New Orleans LA.
- 2014 **Kurnath, P** and MD Dearing. Intersociety Meeting: Comparative Physiology, San Diego CA. 2013
 Kurnath, P and MD Dearing. Gordon Research Conference: Plant-Herbivore Interactions, Ventura CA.

Professional Training: Pedagogy & Public Engagement

- 2015 Workshop. Unconscious Biases, University of Utah, Center for Teaching & Learning Excellence. Illuminated potential biases, discussed how they affect student learning, and strategized ways to deal with them in a classroom setting.
- 2014 Workshop series. Science Communication Fellows Program, National History Museum of Utah. Identified and practiced effective science communication strategies (i.e., analogies, framing concepts, avoiding jargon) that assist professionals in communicating complex information to a lay audience. Funded by NSF & Portal to the Public.
- 2013 Workshop. Science: Becoming the Messenger, National Science Foundation, hosted in Salt Lake City. Learned how to craft a message and deliver it via a variety of media outlets. Participated in live interview training, developed writing and new media skills, honed public presentations, and produced short videos.

Mentoring Experience

All students listed here were under my direct mentorship, made significant research contributions, and/or presented aspects of their work at local meetings or national conferences. Five mentees were women and/or members of under-represented groups in the sciences.

Student	Mentoring period	Current Position
Mandy Giles*†	June 2014 – May 2015	Utah Cancer Registry
Shayla Walker	May 2014 – July 2014	
Aliya Khan‡	Jan. 2014 – Apr. 2014	
Natalie Merz*	June 2013 – Aug. 2014	PA, Idaho State Uni. in progress
Adam Schmidt	June 2013 – Dec. 2013	
Colin McNamara	Nov. 2012 – May 2013	
Ben Larson	May 2012 – Sept. 2012	
Ethan King	Jan. 2011 – May 2012	

* Denotes co-authorship of a publication

† Denotes UROP recipient (Undergraduate Research Opportunity Program, University of Utah)

‡ Denotes ACCESS award (prestigious program for first-year female students in science and mathematics, University of Utah)

Selected Professional Activities & Service (full list on request)

- 2018 Judge, American Society of Mammalogists: Judged multiple student presentations during annual conference in Manhattan, KS.
- 2017 Reviewer, for Behavioral Ecology, Journal of Thermal Biology, and Oecologia.
Session Chair, Society for Integrative and Comparative Biology: Led complimentary session to Evolutionary Impacts of Seasonality Symposium at annual SICB conference.
- 2012-2016 Chair and Seminar Coordinator, Graduate and Advanced Lady Scientists (GALS): An interdisciplinary, cross-campus group to provide female scientists with tools for a fulfilling scientific career. As chair, I organized seminars, social events, and coordinated professional development workshops on topics such as self-promotion skills, conflict resolution, networking and mentoring.
- 2013 Student Representative, Graduate Admissions Committee, Dept. of Biology: Reviewed graduate student applications, conducted in-person interviews and decided acceptance.

Invited Seminars

- 2018 Biology Department, Saint Anselm College, Manchester NH Biology Department, Fitchburg State University, Fitchburg, MA
- 2017 Biology Department, Siena College, Loudonville, NY
Biology Department, University of Maine Farmington, Farmington ME Department of Zoology, Weber State University, Ogden, UT
Department of Zoology & Physiology, University of Wyoming, Laramie, WY
- 2015 Research School of Biology, Australian National University, Canberra, ACT, Australia 2012 Woods Cross High School, Woods Cross, UT
Academy for Math, Engineering and Science Charter School Science Fair, Salt Lake City, UT

Selected Symposia (full list on request)

- 2014 Giles M, Kurnath P and Dearing MD. Undergraduate Research Opportunity Program Symposium, University of Utah, Salt Lake City, UT (presented by M Giles)
- 2013 Kurnath, P and MD Dearing. Global Change & Sustainability Center Symposia, University of Utah, Salt Lake City, UT

Selected Media Coverage (full list on request)

- 2018 "March Madness Is About Animals Now", interview with Gizmodo Media about March Mammal Madness outreach project, posted online 3/18/2018, [Earther](#)
- 2017 "Woodrats Can't Stomach Favorite Foods at High Temps", press release for Connors et al. 2017 Mol. Ecol., posted online 6/27/2017, [University of Utah](#)
Interview with [Natural History](#), article published 10/2017

- 2016 “Poison Warmed Over: Climate Change May Hurt Animals’ Ability to Live on Toxic Plants”, press for Kurnath et al. 2016 Proc. R. Soc. B., posted online 1/13/2016 [University of Utah](#), [IFL Science](#), [Gizmodo](#), [Salt Lake Tribune](#)
- Interviews with [Cool Science Radio](#), KPCW in Park City UT, aired 1/14/2016 [Quirks & Quarks](#), Canadian Broadcasting Corporation, aired 1/16/2016 [The New York Times](#), article published 1/19/2016
- 2014 Biology Letters Board Member Favourite, 3/13/14, Kurnath and Dearing 2013 selected by John Speakman PhD, <http://rsbl.royalsocietypublishing.org/content/john-speakmans-favourites>

Selected Outreach & Community Education (*full list on request*)

- 2017-present Contributor, March Mammal Madness: Participated in annual tournament of simulated combat competition among mammals. Researched scientific literature and composed battles, thereby educating participants through social media about inter-species interactions, ecological principles, natural selection, and endangered species. More can be found here: <https://libguides.asu.edu/MarchMammalMadness/2018MMM>
- 2014, 2017 Scientist in the Spotlight, Natural History Museum of Utah: Developed and presented multiple interactive, conversational presentations about local packrat ecology for museum guests.
- 2011-2015 Volunteer, FIRST LEGO League: Competitions for student ages 9-14 centered around a LEGO robotics program as a way to excite kids about science, engineering and business-related fields. Referred and judged projects at Qualifiers and State Championships in Utah.

References

Dr. M. Denise Dearing, *Ph.D. Thesis Advisor*
 Distinguished Professor and Director, School of Biological Sciences
 University of Utah
denise.dearing@utah.edu
 801-585-1298

Dr. Chris Hoagstrom, *Visiting Assistant Professor and Adjunct Advisor*
 Professor and Chair, Department of Zoology
 Weber State University
ChristopherHoagstrom@weber.edu
 801-626-7486

Dr. Jon Seger, *Teaching Mentor*
 Professor, Departments of Biology and Math
 University of Utah
seger@math.utah.edu
 801-581-4758

Paul M. Hampton
Curriculum Vitae

Colorado Mesa University
Department of Biology
1000 North Avenue
Grand Junction, Colorado 81501-3122
Email: pahampton@coloradomesa.edu
Work Phone: (970) 248 -1585

EDUCATION

Ph.D. Ecology and Evolutionary Biology, University of Louisiana at Lafayette. 2010.

M.S. Biology, University of Texas at Tyler. 2004.

B.S. Biological Sciences, Eastern Illinois University. 2001.

ACADEMIC EMPLOYMENT

Associate Professor, Colorado Mesa University, 2016-present.

Assistant Professor, Colorado Mesa University, 2012-2016.

Faculty Lecturer, Carroll University. 2010-2012.

Research Assistant, University of Louisiana at Lafayette. Energetics of rattling in rattlesnakes; an NSF funded project awarded to B.R. Moon. 2008-2010.

Doctoral Fellow, University of Louisiana at Lafayette. 2005-2008.

Lecturer, University of Louisiana at Lafayette. 2007.

- General Biology II

Teaching Assistant, University of Louisiana at Lafayette. 2006-2007.

- General Biology I and II lab

Adjunct Lecturer, University of Texas at Tyler. 2005.

- Labs for Human Anatomy and Physiology, Herpetology

Teaching Assistant, University of Texas at Tyler. 2002-2004.

- Labs for Biology I and II, Ecology, Vertebrate Natural History

MENTORING EXPERIENCE

Research advisor for 18 undergraduate students at Colorado Mesa University.

Research advisor for 5 undergraduate students at Carroll University and 7 undergraduate students at the University of Louisiana at Lafayette.

Research supervisor for four high school students while at UL Lafayette.

PEER-REVIEWED PUBLICATIONS (26)

* denotes undergraduate student

Hampton, P.M. 2019. Foraging ecology influences the number of vertebrae in hydrophiine sea snakes. *Biological Journal of the Linnean Society*.

Hampton, P.M. 2019. Interspecific variation in organ position in hydrophiine snakes is explained by modifications to the vertebral column. *Biological Journal of the Linnean Society*.

Hampton, P.M. 2019. Comparing external measurements to their respective bone components of the snake skull. *Herpetological Review*. 50:

Otto, K.L.* and P.M. Hampton. 2018. Advertisement call of the glass frogs *Centrolene bacatum* and *Centrolene buckleyi* (Anura: Centrolenidae) from the Napo Region of Ecuador. *Herpetological Review*. 49:658-659.

Hampton, P.M. 2018. Morphological indicators of gapes size for red-tailed pipe snakes (*Cylindrophis ruffus*). *Journal of Herpetology*. 52:425-429.

Hampton, P.M. 2018. Ecology of the yellow-bellied watersnake (*Nerodia erythrogaster flavigaster*) in an Eastern Texas floodplain. *Southwestern Naturalist*. 63:182-185.

Hampton, P.M. 2018. Ontogenetic prey size selection: predator size and functional limitations to handling minimum prey sizes. *Journal of Zoology*. 126:103-109.

Hampton, P.M. and K.L. Otto*. 2014. Notes on the reproductive biology of the glass frog *Centrolene bacatum*. *Phyllomedusa*. 13(2):137-140.

Hampton, P.M. and T.C. Kalmus*. 2014. The allometry of cranial morphology and gape size in mud snakes (*Farancia abacura*). *Herpetologica*. 70(3):290-297.

Hampton, P.M. 2014. Allometry of cranial morphology, gape size and ingestion performance in the banded watersnake (*Nerodia fasciata*) feeding on two types of prey. *Journal of Experimental Biology*. 217(3):472-478.

- Hampton, P.M. 2013. Feeding in natricines: relationships among feeding morphology, behavior, performance, and preferred prey type. *Journal of Zoology*. 290(3):215-224.
- Hampton, P.M. and B.R. Moon. 2013. Morphological components of gape size in western diamond-backed rattlesnakes (*Crotalus atrox*). *Journal of Morphology*. 274(2):194-202.
- Hampton, P.M. 2011. Comparison of cranial form and function in association with prey preference in natricine snakes. *Journal of Morphology*. 272(12):1435-1443.
- Hampton, P.M. 2011. Feeding performance in the western ribbon snake: ontogeny and the effects of prey type and size. *Canadian Journal of Zoology*. 89(10):945-950.
- Hampton, P.M. 2011. Ventral and sub-caudal scale counts are associated with macrohabitat use and tail specialization in viperid snakes. *Evolutionary Ecology*. 25(2):531-546.
- Hampton, P.M., N.B. Ford, K. Herriman. 2010. Impacts of active oil pumps and deer feed plots on Amphibian and Reptile Assemblages in a floodplain. *American Midland Naturalist*. 163(1):44-53.
- Hampton, P.M. 2009. Ecology of the Western Lesser Siren, *Siren intermedia nettingi*, in an isolated East Texas pond. *Journal of Herpetology*. 43(4):704-709.
- Ford, N.B. and P.M. Hampton. 2009. Ontogenetic and sexual differences in diet in an actively foraging snake, *Thamnophis proximus*. *Canadian Journal of Zoology*. 87(3):254-261.
- Hampton, P.M., N.E. Haertle, S.F. Dartz, C. Monteiro. 2009. Prey of the Broad-banded (*Nerodia fasciata*) and the Diamondback watersnakes (*Nerodia rhombifer*). *Southwestern Naturalist*. 54(4): 521-523.
- Hampton, P.M. and N.E. Haertle. 2009. A new view from a novel squeeze box design. *Herpetological Review*. 40:44.
- Hampton, P.M. 2008. A report of new prey items of the western ribbon snake, *Thamnophis proximus*. *Southwestern Naturalist*. 53(1):116-119.
- Hampton, P.M. and N.B. Ford. 2007. The effects of flood suppression on natricine snake diet and prey overlap. *Canadian Journal of Zoology*. 85(7):809-814.
- Hampton, P.M. 2007. A comparison of artificial cover types, Plywood and corrugated tin. *Amphibia-Reptilia*. 28(3):433-437.
- Fontenot, B.E., N.B. Ford, R. Brenes, and P.M. Hampton. 2006. New county records for reptiles and amphibians from northeast Texas. *Herpetological Review*. 37:111-112.
- Ford, N.B. and P.M. Hampton. 2005. The amphibians and reptiles of Camp Maxey, Lamar County, Texas with comments on census methods. *The Texas Journal of Science*. 57(4):359-370.

Foster, C.D. and P.M. Hampton. 2003. A survey of amphibians and reptiles in three state parks in east central Illinois. Transactions of the Illinois State Academy of Science. 96:219-228.

NATURAL HISTORY NOTES (18)

- Haertle, N.E., P.M. Hampton, P.N. Vogrinc, J.D. Wilson. 2015. *Farancia abacura* (red-bellied mudsnake). Feeding Behavior. Herpetological Review. 46: 449-450.
- Dartez, S.F., P.M. Hampton, N.E. Haertle, C.S. Monteiro. 2011. *Lampropeltis getula holbrooki*. Diet. Herpetological Review. 42:293.
- Hampton, P.M. 2011. *Micrurus fulvius*. Diet. Herpetological Review. 42:294.
- Hampton, P.M. 2010. *Causus rhombeatus*. Diet. Herpetological Review. 41:234-235.
- Fontenot, B.E. and P.M. Hampton. 2009. *Scaphiophus couchii*. Predation. Herpetological Review 40:73.
- Hampton, P.M. 2008. *Farancia abacura*. Predation. Herpetological Review 39:469-470.
- Hampton, P.M. and B.E. Fontenot. 2007. *Thamnophis marcianus marcianus*. Diet. Herpetological Review 38:95.
- Hampton, P.M. 2007. *Thamnophis proximus proximus*. Necrophagy. Herpetological Review 38:94-95.
- Hampton, P.M. 2007. *Nerodia erythrogaster flavigaster*. Anti-predatory Behavior. Herpetological Review 38:91.
- Hampton, P.M. 2007. *Nerodia fasciata confluens*. Diet. Herpetological Review 38:91.
- Hampton, P.M. 2007. *Nerodia erythrogaster flavigaster*. Diet. Herpetological Review 38:91.
- Hampton, P.M. 2006. *Notophthalmus viridescens louisianensis*. Gilled Adult Population. Herpetological Review 37:71.
- Hampton, P.M. 2006. *Ambystoma t. tigrinum*. Paedomorphic Population. Herpetological Review 37:69.
- Hampton, P.M. and N.B. Ford. 2005. *Agkistrodon piscivorus*. Reproduction. Herpetological Review 36:455.
- Hampton, P.M. 2005. *Agkistrodon piscivorus*. Morphology. Herpetological Review 36:454-455.
- Braman, S.C. and P.M. Hampton. 2005. *Elaphe obsoleta*. Diet. Herpetological Review 36:194.
- Hampton, P.M. and M.L. Nicholson. 2004. *Hyla cinerea*. Geographical Distribution. Herpetological Review 35:403.

Hampton, P.M., C.D. Foster and J.B. Towey. 2004. *Scincella lateralis*. Predation. *Herpetological Review* 35:269-270.

MANUSCRIPTS IN PREPARATION (DRAFT AVAILABLE)

* denotes undergraduate student

Hampton, P.M. and C.C. Clarke*. Comparative trophic morphology of sea snakes in relation to feeding ecology. *Target journal: Evolutionary Ecology*.

Clarke, C.C.* and P.M. Hampton. Single large or several small: Prey size selection and its effect on swimming by ribbon snakes. *Target journal: Journal of Herpetology*.

Hampton, P.M. and J.M. Meik. Trophic morphology and prey shape in snakes. *Target journal: Evolution*.

TECHNICAL REPORTS

Ford, N.B. 2003. Inventory of the amphibians and reptiles of Camp Maxey. Species accounts by P.M. Hampton. Prepared for the Army National Guard.

ORAL PRESENTATIONS (15)

Hampton, P.M. Is foraging ecology an overlooked influence on organ position in snakes? Joint meeting of the American Society of Ichthyologists and Herpetologists, Herpetologist's League and the Society for the Study of Amphibians and Reptiles. July 2018.

Hampton, P.M. Ontogeny of prey size: A functional explanation for prey size selection patterns in snakes. Joint meeting of the American Society of Ichthyologists and Herpetologists, Herpetologist's League and the Society for the Study of Amphibians and Reptiles. July 2015.

Hampton, P.M. Macroecological patterns associated with diet breadth in snakes. Joint meeting of the American Society of Ichthyologists and Herpetologists, Herpetologist's League and the Society for the Study of Amphibians and Reptiles. July 2011.

Haertle, N. and P.M. Hampton. Color pattern variation in copperhead snakes (*Agkistrodon contortrix*). Louisiana Herpetological Group Meeting. 2010.

Hampton, P.M. Interspecific feeding performance among natricines. Joint meeting of the American Society of Ichthyologists and Herpetologists, Herpetologist's League and the Society for the Study of Amphibians and Reptiles. July 2009.

Hampton, P.M. Morphological and anatomical correlates to prey shape in snakes. Society of Integrative and Comparative Biologists. January 2009.

- Hampton, P.M. Morphological and anatomical correlates to prey shape in snakes. Louisiana Herpetological Group Meeting. November 2008.
- Hampton, P.M. Morphological and anatomical correlates to prey shape in snakes. University of Louisiana at Lafayette Graduate Student Symposium. October 2008.
- Hampton, P.M. Ecomorphology in viperids: evolution of vertebral number in relation to habitat and tail use. University of Louisiana at Lafayette Graduate Student Symposium. November 2007.
- Hampton, P.M. The effects of flood suppression on dietary niche overlap in natricines. University of Louisiana at Lafayette Graduate Student Symposium. October 2006.
- Hampton, P.M. and N.B. Ford. The effects of flood suppression on diet and niche overlap in natricines. Meeting of the Louisiana Association of Professional Biologists. August 2006.
- Hampton, P.M. and N.B. Ford. The effects of flood suppression on diet and competition in some natricines. Joint meeting of the American Society of Ichthyologists and Herpetologists, Herpetologist's League and the Society for the Study of Amphibians and Reptiles. July 2006.
- Hampton, P.M. Effects of habitat modifications on amphibian and reptile communities in an east Texas floodplain. University of Louisiana at Lafayette Graduate Student Symposium. September 2005.
- Hampton, P.M. Effects of management techniques on amphibian and reptile populations in an east Texas floodplain. Joint meeting of the American Society of Ichthyologists and Herpetologists, Herpetologist's League and the Society for the Study of Amphibians and Reptiles. June 2004.
- Ford, N.B., P.M. Hampton and D.B. Ford. Ontogenetic and seasonal variation in diet of the Western Ribbon Snake, *Thamnophis proximus*, in a northeast Texas floodplain. Joint meeting of the American Society of Ichthyologists and Herpetologists, Herpetologist's League and the Society for the Study of Amphibians and Reptiles. June 2004.
- Hampton, P.M. and N.B. Ford. Anthropogenic effects on the herpetofauna of the Old Sabine Bottom Wildlife Management Area. Southwestern Association of Naturalists. April 2004.

POSTER PRESENTATIONS (23)

* denotes undergraduate student

- Hampton, P.M. and J.M. Meik. Trophic morphology and prey shape in snakes. Joint meeting of the American Society of Ichthyologists and Herpetologists, Herpetologist's League and the Society for the Study of Amphibians and Reptiles. July 2018.
- Clarke, C.* and P.M. Hampton. Comparative Trophic Morphology of Sea Snakes in Relation to Feeding Ecology. Joint meeting of the American Society of Ichthyologists and Herpetologists, Herpetologist's League and the Society for the Study of Amphibians and Reptiles. July, 2016.

- Clarke, C.*, B. Workman*, M. Gall* and P.M. Hampton. Single large or several small: Prey size selection and its effect on swimming by ribbon snakes. Joint meeting of the American Society of Ichthyologists and Herpetologists, Herpetologist's League and the Society for the Study of Amphibians and Reptiles. July 2015.
- Workman, B. *, C. Clarke*, M. Gall* and P.M. Hampton. Single large or several small: Prey size selection and its effect on terrestrial locomotion of ribbon snakes. Joint meeting of the American Society of Ichthyologists and Herpetologists, Herpetologist's League and the Society for the Study of Amphibians and Reptiles. July 2015.
- Hampton, P.M. Relationships among dietary richness, geographic range and morphology in snakes. Ecological Society of America Annual Meeting. August 2011.
- Moon, B.R., N. Haertle, P.M. Hampton. Rates of breathing, oxygen consumption, and evaporative water loss in rattlesnakes. Joint meeting of the American Society of Ichthyologists and Herpetologists, Herpetologist's League and the Society for the Study of Amphibians and Reptiles. July 2011.
- Kalmus, T.C.* and P.M. Hampton. Single large or several small: effect of prey size on the price of a meal. Joint meeting of the American Society of Ichthyologists and Herpetologists, Herpetologist's League and the Society for the Study of Amphibians and Reptiles. July 2011.
- Moon, B.R. and P.M. Hampton. Using rattlesnake shaker muscle to test how long tendons affect the energetic cost of contraction. Ninth International Congress of Vertebrate Morphology, Punta del Este, Uruguay, July 2010.
- Hampton, P.M. and B.R. Moon. Morphological contributors to gape size in snakes. Ninth International Congress of Vertebrate Morphology, Punta del Este, Uruguay, July 2010.
- Hampton, P.M. and B.R. Moon. Morphological contributors to gape size in snakes. Joint meeting of the American Society of Ichthyologists and Herpetologists, Herpetologist's League and the Society for the Study of Amphibians and Reptiles. July 2010.
- Moon, B.R. and P. M. Hampton. Respiratory water loss during rattling in rattlesnakes. Joint meeting of the American Society of Ichthyologists and Herpetologists, Herpetologist's League and the Society for the Study of Amphibians and Reptiles. July 2010.
- Hampton, P.M. Does prey envenomation improve digestive performance in *Agkistrodon piscivorus*? Joint meeting of the American Society of Ichthyologists and Herpetologists, Herpetologist's League and the Society for the Study of Amphibians and Reptiles. July 2009.
- Moon, B.R. and P.M. Hampton. Using rattlesnake shaker muscle to test how long tendons affect the energetic cost of contraction. Joint meeting of the American Society of Ichthyologists and Herpetologists, Herpetologist's League and the Society for the Study of Amphibians and Reptiles. July 2009.

- Hampton, P.M. Ecological and morphological correlates of foraging mode in snakes. Snake Ecology Group Meeting. July 2009.
- Moon, B.R. and P.M. Hampton. The effects of long tendons on the energetic cost of muscle contraction. Society of Integrative and Comparative Biologists. January 2009.
- Hampton, P.M. Does prey envenomation improve digestive performance in *Agkistrodon piscivorus*? Society of Integrative and Comparative Biologists. January 2009.
- Hampton, P.M. Ecological and Morphological Correlates of Foraging Mode in Snakes. University of Louisiana at Lafayette Graduate Student Symposium. October 2008.
- Hampton, P.M. and J.M. Meik. Historical Biogeography of New World Natricines. University of Louisiana at Lafayette Graduate Student Symposium. November 2007.
- Hampton, P.M. and J.M. Meik. Historical Biogeography of New World Natricines. Annual meeting of the Herpetologists' League/American Society of Ichthyologists and Herpetologists. July 2007.
- Hampton, P.M. and M.L. Nicholson. Ecology of *Siren intermedia* in an isolated pond. Joint meeting of the American Society of Ichthyologists and Herpetologists, Herpetologist's League and the Society for the Study of Amphibians and Reptiles July 2005.
- Hampton, P.M. and N.B. Ford. Food partitioning by three species of semi-aquatic snakes in an East Texas Floodplain. Snake Ecology Group Meeting IV. May 2004.
- Hampton, P.M. Habitat use by herpetofauna in a disturbed floodplain in Smith County, Texas. Joint meeting of the American Society of Ichthyologists and Herpetologists, Herpetologist's League and the Society for the Study of Amphibians and Reptiles. June 2003.

SELECTED AWARDS, GRANTS AND SCHOLARSHIPS

- United States Geological Survey. \$33,298. 2019. Survey of the amphibians in McInnis Canyon National Conservation Area and the presence of the pathogenic fungus *Batrachochytrium dendrobatidis*
- Saccomanno Internship Program in Biological Research. \$ 1,500. 2018. Evaporative water loss in garter snakes.
- Saccomanno Internship Program in Biological Research. \$ 1,500. 2018. Thermal ecology and blood characteristics in garter snakes.
- Faculty Professional Development Fund, Colorado Mesa University. \$1,400. 2017. Travel to Joint Meeting of Ichthyologists and Herpetologists, July 2018.
- Faculty Professional Development Fund, Colorado Mesa University. \$1,755. 2016. High speed camera equipment for amphibian and reptile performance measures.

- Saccomanno Internship Program in Biological Research. \$ 1,500. 2016. Comparative Trophic Morphology of Sea Snakes in Relation to Feeding Ecology.
- Faculty Professional Development Fund, Colorado Mesa University. \$1,120. 2014. Precision scale for evaporative water loss study.
- Saccomanno Internship Program in Biological Research. \$ 1,500. 2014. Physiological ecology of garter snakes along an elevation gradient.
- Faculty Professional Development Fund, Colorado Mesa University. \$2,150. 2013. Equipment to expand Bio 341: General Physiology Labs to field studies.
- Faculty Professional Development Fund, Colorado Mesa University. \$1,775. 2012. Effects of prey size on feeding efficiency in snakes exhibiting telescoping and ontogenetic changes in diet.
- Pioneer Scholar Grant, Carroll University. \$2000. 2012. Prey size selection and its effect of locomotion in snakes.
- Faculty Improvement Grant. Carroll University. \$160. 2011. Influence of island biogeography and ecology on snake morphology.
- Faculty Improvement Grant, Carroll University. \$1290. 2011. Relationships among dietary richness, geographic range and morphology in snakes.
- Pioneer Scholar Grant, Carroll University. \$2000. 2011. Single large or several small: effect of prey size on the price of a meal.
- Faculty Improvement Grant, Carroll University. \$700. 2010. Single large or several small: effect of prey size on the price of a meal.
- Howard McCarley Student Research Award, Southwestern Association of Naturalists. \$1000. 2009. Venom function in pitvipers: Does prey envenomation enhance digestive performance and reduce its cost?
- Chicago Herpetological Society, Graduate Student Research in Herpetology Grant. \$500. 2009. Venom function in pitvipers: Does prey envenomation enhance digestive performance and reduce its cost?
- Chicago Field Museum of Natural History Visiting Scholarship. \$1400. 2008. The evolution of gape in snakes and its relation to prey richness, range size and species radiation.
- Best poster presentation, UL Lafayette Graduate Student Symposium, 2008. Ecological and morphological correlates of foraging mode in snakes.
- University of Louisiana at Lafayette, Doctoral Fellowship. 2005-2008.
- Rockefeller State Wildlife Scholarship. \$1000. 2008, 2009.

Best oral presentation, UL Lafayette Graduate Student Symposium, 2007. Evolution of vertebral number, macrohabitat use and tail specialization in the family Viperidae.

University of Louisiana at Lafayette, GSO travel award. \$400. 2006, 2007.

University of Louisiana at Lafayette, GSO research grants (8).

Society for the Study of Amphibians and Reptiles Graduate Student Travel Award. \$200. 2005.

University of Texas at Tyler graduate student scholarship. \$1000. 2002, 2003.

Texas Herpetological Society. \$500. 2003. Impacts of active oil pumps and deer feed plots on amphibian and reptile assemblages in a floodplain.

PROFESSIONAL SERVICE AND PUBLIC OUTREACH

Journal Referee:

American Midland Naturalist (1), Amphibia-Reptilia (1), Biologia (1), Biological Journal of the Linnean Society (1), Canadian Journal of Zoology (3), Herpetologica (4), Herpetological Conservation and Biology (1), Herpetology Notes (1), Journal of Arid Environments (1), Journal of Herpetology (1), Journal of Zoology (1), PeerJ (1), Southeastern Naturalist (1), Southwestern Naturalist (2), Transactions of the Illinois Academy of Sciences (1), Zoology (2).

Scholastic Committees:

Student Showcase Committee, Colorado Mesa University, 2017-present.

Biology Graduate Program Committee, Colorado Mesa University, 2017-present.

Tutorial Center Advisory Committee, Colorado Mesa University. 2016-present.

Graduate Curriculum Committee, Colorado Mesa University. 2013-present.

Assistant Professor of Physiology Search Committee. Colorado Mesa University. Spring 2018.

Assistant Professor of Mammalogy Search Committee. Colorado Mesa University. Spring 2015.

Assistant Professor of Nursing Search Committee. Colorado Mesa University. Fall 2014.

Assistant Professor of Molecular Genetics Search Committee. Colorado Mesa University. Spring 2014.

Assistant Professor of Nursing Search Committee. Colorado Mesa University. Spring 2014.

Assistant Professor of Vertebrate Biology Search Committee. Colorado Mesa University. Spring 2013.

Faculty Evaluation Committee, Carroll University. 2011-2012.

Program Curriculum Assessment Committee, Carroll University. 2011-2012.

Herpetologist's League Graduate Student Studies Committee, Co-Chair. 2009-2010.

Herpetology Education Awards Committee, 2010.

Graduate Student Symposium Committee, Chair. 2008, 2009.

Community Service:

John McConnell Math and Science Center. 2016 - 2018. Advisory committee for exhibition design.

Pomona Elementary School, Enrichment Day. April 2016. Natural history of local amphibians and reptiles.

John McConnell Math and Science Center, Saturday Afternoon Science. Fall 2015. Amphibians and Reptiles of Western Colorado.

STEM program, Dual Immersion Academy. January 2015. Snake feeding.

Junior Scientist Presentation at Mesa County Public Library. 2014. Feeding modes in reptiles.

Frogwatch. 2014.

Junior Scientist Presentation at Mesa County Public Library. 2013. Amphibians and Reptiles.

Amphibians, presented to Discovery Kids Learning Center. Spring and fall 2013.

Experience Atchafalaya Days, public education about local snakes. 2009.

Education demonstrations for middle school. 2008.

Science Olympiad, Herpetology for High School. 2008, 2009.

Science Olympiad, Amphibians and Reptiles for Junior High. 2008, 2009.

Tyler Independent School District, educational presentations. 2002-2005.

Boy Scouts of America, Instructor for Amphibian and Reptile merit badge. 2002.

Eriek S. Hansen - Curriculum Vitae

Department of Biological Sciences, Colorado Mesa University
1100 North Avenue, Grand Junction, Colorado 81501
Phone: 970-248-1562, Email: erihansen@coloradomesa.edu

EDUCATION

Doctor of Philosophy – Ecology. University of Wyoming, Laramie, Wyoming. August 2013.
Temporal Variations in Riverine Fish Habitat and the Potential Responses of Fish.

Master of Science – Aquatic Ecology. Utah State University, Logan, Utah. December 15, 2007.
Evaluating the effectiveness of passive stream restoration for improving native fish health and minimizing the impacts of disease.

Bachelor of Science – Fisheries and Wildlife Management. Utah State University, Logan, Utah.
May 5, 2000.

EMPLOYMENT

July 2018 – Present. Associate Professor of Biology. Department of Biological Sciences, Colorado Mesa University. Tenure awarded July 2019.

August 2013 – June 2018. Assistant Professor of Biology. Department of Biological Sciences, Colorado Mesa University.

May 1999 – February 2000. Utah State University, Department of Fisheries and Wildlife.
Research Technician. Research of walleye in five mid-elevation Utah reservoirs.

TEACHING EXPERIENCE

General Human Biology (BIOL 101). Instructor. Colorado Mesa University, Department of Biological Sciences.

General Human Biology Laboratory (BIOL 101L). Instructor. Colorado Mesa University, Department of Biological Sciences.

Human Anatomy and Physiology (BIOL 209). Instructor. Colorado Mesa University, Department of Biological Sciences.

Human Anatomy and Physiology (BIOL 209L). Instructor. Colorado Mesa University, Department of Biological Sciences.

Fish Biology (BIOL 336). Instructor. Colorado Mesa University, Department of Biological Sciences.

Fish Biology Laboratory (BIOL 336L). Instructor. Colorado Mesa University, Department of Biological Sciences.

Freshwater Ecology/Aquatic Biology (BIOL 414). Instructor. Colorado Mesa University, Department of Biological Sciences.

Freshwater Ecology/Aquatic Biology Laboratory (BIOL 414L). Instructor. Colorado Mesa University, Department of Biological Sciences.

Structured Research (BIOL 387). Advisor. Colorado Mesa University, Department of Biological Sciences.

Fisheries Management (BIOL 396). Instructor. Colorado Mesa University, Department of Biological Sciences.

Winter Ecology (BIOL 396). Instructor. Colorado Mesa University, Department of Biological Sciences.

Advanced Research (BIOL 487). Advisor. Colorado Mesa University, Department of Biological Sciences.

Senior Thesis (BIOL 483). Instructor. Colorado Mesa University, Department of Biological Sciences.

Lab Teaching Practicum (BIOL 493). Advisor. Colorado Mesa University, Department of Biological Sciences.

Internship (BIOL 499). Advisor. Colorado Mesa University, Department of Biological Sciences.

First Year College Success (UNIV 101). Instructor. Colorado Mesa University.

TEACHING TRAINING RECEIVED

Breaking the Iron Cage of Poverty: Tools for Increasing Educational Success and Communicating, and Relating More Effectively with Students Who Live in the Crisis of Poverty. Spring 2017.

Mental Health and Suicide Prevention, Title IX, and Diversity and Inclusion in-service. Fall 2016.

Safe Zone training. Spring 2016.

Professionalism & Classroom Management Strategies, Effective Constructive Criticism, and Dealing with Volatile Students in-service. Spring 2016.

A Case Study of STEM and Experiential Learning: Promoting Student Learning, Teacher Development and Parent Awareness. Faculty Colloquium by Dr. Jennifer Daniels. Fall 2015.

Lost in Space: Not If They Are Engaged. Faculty Colloquium by Dr. Cynthia Chovich. Fall 2015.

Campus Safety and Active Threat Response, Suicide Prevention Efforts and Related Resources, and Sexual Assault Prevention Efforts, Mandatory Reporting and Related Resources in-service. Spring 2015.

Assessing Outcomes and Improving Achievement: Tips and tools for Using Rubrics, Professional Development Workshop. Colorado Mesa University, Grand Junction, CO. January 16-17, 2014.

TEACHING TRAINING PROVIDED

- Teacher²Teacher Fall Workshop 2017. *Ask Me, Tell Me...* Colorado Mesa University. October 3, 2017.
- Teacher²Teacher Fall Workshop 2016. *Faculty Feud*. Colorado Mesa University. October 12, 2016.
- Teacher²Teacher Fall Workshop 2015. *Academic Speed Dating*. Colorado Mesa University. November 11, 2015.
- Teacher²Teacher Spring Workshop 2015. *Milestone Courses*. Colorado Mesa University. February 17, 2015.
- Teacher²Teacher Spring Workshop 2014. *What Works For Me" TED Talk*. Colorado Mesa University. April 1, 2014.
- Teacher²Teacher Fall Workshop 2013. *What to do when _____ and What to do to _____*. Student Engagement. Colorado Mesa University. October 20, 2013.

OUTREACH

- Eureka! Science Museum. Endangered fishes display and aquarium. 2018-Present.
- Pomona Elementary School. Cluster day. "One of these fish is not like the other". Spring 2016 and 2017.
- Mesa County Libraries, Jr. Scientist Academy. Facilitated the activity "One of these fish is not like the other". Fall 2016.
- John McConnell Math & Science Center of Western Colorado. Biology Content Committee. 2016-2017.
- John McConnell Math & Science Center of Western Colorado and Grand Valley Anglers, Trout Unlimited. The Science of Fly Fishing. Food webs. Summer 2014.
- Fish and Wildlife Club, Colorado Mesa University. American Fisheries Society, CO-WY Chapter Subunit. Club co-advisor and initiated club formation. Fall 2013 to Present.
- John McConnell Math & Science Center of Western Colorado and Grand Valley Anglers, Trout Unlimited. Consulted on Trout in the Classroom. Fall 2013 - spring 2015.
- Mesa County Libraries, Jr. Scientist Series. "One Fish, Two Fish ..." activity on observation, inference, and fish ecology. Fall 2013.

PUBLICATIONS

- Baigent, C., C. J. Agan, M. Connor, and **E. S. Hansen**. *Accepted*. Autopsy as a form of evisceration: Implications for decomposition rate, pattern, and estimation of postmortem interval. *Forensic Science International*.
- Connor, M., C. Baigent, and **E. S. Hansen**. 2019. Measuring desiccation using qualitative changes: a step toward determining regional decomposition sequences. *Journal of Forensic Sciences* 64(4): 1004-1011. DOI: 10.1111/1556-4029.14003.

- Connor, M., C. Baigent, and **E. S. Hansen**. 2018. Testing the use of pigs as human proxies in decompositions studies. *Journal of Forensic Sciences* 63(5): 1350-1355.
- Hansen, E. S.**, C. Baigent, S. I. Reck, and M. Connor. 2018. Bioelectrical impedance as a technique for estimating postmortem interval. *Journal of Forensic Sciences* 62(4): 1186-1190.
- Hansen, E. S.** and F. J. Rahel. 2015. Fish energy use among fluctuating and constant thermal regimes simulating winter conditions in rivers. *Transactions of the American Fisheries Society* 144: 990-997.

PUBLISHED ABSTRACTS

- Connor, M. A., C. Baigent, and E. S. Hansen. 2018. Deconstructing desiccation and decomposition. *Proceedings of the American Academy of Forensic Sciences, 70th Annual Scientific Meeting* 24:560.
- Hansen, E. S.**, C. Baigent, and M. A. Connor. 2018. A comparison of bioelectrical impedance analysis techniques for estimating postmortem interval (PMI). *Proceedings of the American Academy of Forensic Sciences, 70th Annual Scientific Meeting* 24:556.
- Agan, C. J., C. Baigent, M. A. Connor, and **E. S. Hansen**. 2018. Decomposition rates: autopsied vs. non-autopsied human remains. *Proceedings of the American Academy of Forensic Sciences, 70th Annual Scientific Meeting* 24:156.
- Hansen, E. S.**, S. I. Reck, and M. A. Connor. 2017. Correlation of bioelectric impedance metrics to accumulated degree-days among body segments using gel pad electrodes. *Proceedings of the American Academy of Forensic Sciences, 69th Annual Scientific Meeting* 23:685-686.
- Hansen, E. S.**, C. Baigent, and M. A. Connor. 2017. Bioelectrical impedance analysis as a technique for estimating the postmortem interval (PMI) in human remains. *Proceedings of the American Academy of Forensic Sciences, 69th Annual Scientific Meeting* 23:788-789.
- Connor, M. A., C. Baigent, and **E. S. Hansen**. 2017. Measuring desiccation using qualitative changes. *Proceedings of the American Academy of Forensic Sciences, 69th Annual Scientific Meeting* 23:790-791.

ORAL PRESENTATIONS

- Hansen, E. S., C. Tucker, and J. Woodling. 2019. Natural hybridization of Golden Shiner (*Notemigonus crysoleucas*) and Rudd (*Scardinius erythrophthalmus*) in a Colorado USA Reservoir. *American Fisheries Society, Colorado-Wyoming Chapter Annual Meeting*. Fort Collins, Colorado, February 26-28, 2019.
- Jensen, J. D., and **E. S. Hansen**. 2018. Quantifying proximate body composition in Catostomids using bioelectrical impedance analysis. *Saccomanno Internship Program in Biological Research Symposium*, Colorado Mesa University.
- Connor, M. A., C. Baigent, and **E. S. Hansen**. 2018. Deconstructing desiccation and decomposition. *American Academy of Forensic Sciences, 70th Annual Scientific Meeting*, Seattle, WA.

- Hansen, E. S.**, C. Baigent, and M. A. Connor. 2018. A comparison of bioelectrical impedance analysis techniques for estimating postmortem interval (PMI). American Academy of Forensic Sciences, 70th Annual Scientific Meeting, Seattle, WA.
- Henson, A. and **E. S. Hansen**. 2017. Quantifying lipid content in suckers. Saccomanno Internship Program in Biological Research Symposium, Colorado Mesa University.
- Connor, M. A., **E. S. Hansen**, and C. Baigent. 2017. Measuring desiccation: a system using bioelectrical impedance analysis. National Institute of Justice, Forensic Science Research and Development Symposium. New Orleans, LA.
- Connor, M. A., C. Baigent, and **E. S. Hansen**. 2017. Measuring desiccation using qualitative changes. American Academy of Forensic Sciences, 69th Annual Scientific Meeting, New Orleans, LA.
- Hansen, E. S.**, C. Baigent, and M. A. Connor. 2017. Bioelectrical impedance analysis as a technique for estimating the postmortem interval (PMI) in human remains. American Academy of Forensic Sciences, 69th Annual Scientific Meeting, New Orleans, LA.
- Crippen, K. C. and **E. S. Hansen**. 2015. Quantifying proximate body composition of Catostomids using bioelectrical impedance analysis. Saccomanno Internship Program in Biological Research Symposium, Colorado Mesa University.
- Partlow, M., **E. S. Hansen**, and D. Gemoets. 2015. Fish movement patterns through two selective fish ladders in the Grand Valley, Colorado. Student Showcase, Colorado Mesa University, Grand Junction, CO.

POSTER PRESENTATIONS

- Henson, A. and **E. S. Hansen**. 2018. Quantifying Lipid Mass in Catostomus Species with the Use of Bioelectrical Impedance Analysis. Student Showcase, Colorado Mesa University, Grand Junction, CO.
- Worth, B. K., **E. S. Hansen**, and M. A. Connor. 2018. Temperature Correction of Bioelectric Impedance Analysis in Forensic Applications. Student Showcase, Colorado Mesa University, Grand Junction, CO.
- Agan, C. J., C. Baigent, M. A. Connor, and **E. S. Hansen**. 2018. Decomposition rates: autopsied vs. non-autopsied human remains. American Academy of Forensic Sciences, 70th Annual Scientific Meeting, Seattle, WA.
- Reck, S. I., **E. S. Hansen**, and M. A. Connor. 2017. Correlation of bioelectric impedance metrics to accumulated degree-days among body segments using gel pad electrodes. Student Showcase, Colorado Mesa University, Grand Junction, CO.
- Morben, K., and **E. S. Hansen**. 2017. Quantifying proximate body composition in Catostomids using bioelectrical impedance analysis. Student Showcase, Colorado Mesa University, Grand Junction, CO. Best poster award.
- Alferos, M. E., K. L. Murphy, M. A. Connor, **E. S. Hansen**, and K. N. White. Investigation of changing soil phosphorous concentrations around decomposing human remains via available phosphorous analysis. Student Showcase, Colorado Mesa University, Grand Junction, CO.

- Morben, K., and **E. S. Hansen**. 2017. Quantifying proximate body composition in Catostomids using bioelectrical impedance analysis. Crossing Borders – Crossing Barriers. Joint Meeting of Utah and Colorado/Wyoming Chapters of the American Fisheries Society, Grand Junction, CO.
- Hansen, E. S.**, S. I. Reck, and M. A. Connor. 2017. Correlation of bioelectric impedance metrics to accumulated degree-days among body segments using gel pad electrodes. American Academy of Forensic Sciences, 69th Annual Scientific Meeting, New Orleans, LA.
- Crippen, K. C., K. Morben, and **E. S. Hansen**. 2016. Quantifying Proximate Body Composition in Catostomids Using Bioelectrical Impedance Analysis. Joint Meeting of Ichthyologists and Herpetologists, New Orleans, LA.
- Morben, K., and **E. S. Hansen**. 2016. Development of temperature correction equations for the use of bioelectrical impedance analysis in Catostomids. Student Showcase, Colorado Mesa University, Grand Junction, CO.
- Reck, S., and **E. S. Hansen**. 2016. Using bioelectrical impedance analysis to estimate post-mortem interval. Student Showcase, Colorado Mesa University, Grand Junction, CO. Best poster award.
- Crippen, K. C. and **E. S. Hansen**. 2015. Quantifying proximate body composition of Catostomids using bioelectrical impedance analysis. Upper Colorado River Basin Water Forum: Managing for Extremes, Colorado Mesa University.
- Crippen, K. C. and E. S. Hansen. 2015. Quantifying proximate body composition of Catostomids using bioelectrical impedance analysis (Oral). Saccomanno Internship Program in Biological Research Symposium, Colorado Mesa University.
- Crippen, K. C. and **E. S. Hansen**. 2015. Quantifying proximate body composition of Catostomids using bioelectrical impedance analysis (Poster). Joint Meeting of Ichthyologists and Herpetologists, Reno, NV.
- Crippen, K., K. Utu, and E. S. Hansen. 2015. Developing techniques for quantifying proximate body composition in fish using bioelectrical impedance analysis. Student Showcase, Colorado Mesa University, Grand Junction, CO.

PROFESSIONAL MEMBERSHIPS

American Fisheries Society – Parent Society, Colorado-Wyoming Chapter and Utah Chapter.
 American Society of Ichthyologists and Herpetologists
 American Academy of Forensic Sciences
 Trout Unlimited – Grand Valley Anglers Chapter.

RESEARCH GRANTS

Faculty Professional Development Grant. Colorado Mesa University. October 2017. \$2,000 for travel to the American Academy of Forensic Sciences, 70th Annual Scientific Meeting, Seattle, WA.

Faculty Professional Development Grant. Colorado Mesa University. October 2016. \$2,541 for travel to the American Academy of Forensic Sciences, 69th Annual Scientific Meeting, New Orleans, LA.

National Institute of Justice, Department of Justice, Office of Justice. NIJ FY 15 Research and Development in Forensic Science for Criminal Justice Purposes. *Measuring desiccation: A system using bioelectrical impedance analysis*. \$258,659.50. Sponsor award number 2015-DN-BX-K015. Co-investigator Dr. Melissa Connor. Two-year grant with one-year extension.

Faculty Professional Development Grant. Colorado Mesa University. October 2015. \$1707 for a chiller and heating units for a recirculating aquaculture system.

BIOSYNQ. Department of Biological Sciences, Colorado Mesa University. \$1000 for bullfrog diet study.

Faculty Professional Development Grant. Colorado Mesa University. October 2014. \$2,400 for a YSI Professional Plus Quattro handheld water quality meter.

Faculty Professional Development Grant. Colorado Mesa University. October 2014. \$1,120 for a balance.

Faculty Professional Development Grant. Colorado Mesa University. November 2013. \$3,000 for a bioelectrical impedance analysis unit.

HONORS, AWARDS, RECOGNITION, and SCHOLARSHIPS

Robert Gaffney Achievement Award recipient 2018 for the presentation titled “Bioelectrical Impedance Analysis as a Technique for Estimating the Postmortem Interval (PMI) in Human Remains”. American Academy of Forensic Sciences, 69th Annual Scientific Meeting, New Orleans, LA. February 2017.

Max Rollefson Award of Merit. Colorado-Wyoming Chapter, American Fisheries Society. February 2015.

STUDENTS ADVISED

Leah Antonelli: Distribution of Ancyliidae in the Grand Valley. Summer 2019-present.

Benjamin Fairbanks: Developing bioelectrical impedance analysis techniques for Catostomids. Summer semester 2019-present.

Jefferson Jensen: Developing bioelectrical impedance analysis techniques for Catostomids. Summer semester 2018.

Ashlee Henson: Developing bioelectrical impedance analysis techniques for Catostomids. Summer semester 2017 – spring semester 2018.

Brandy Worth: Determining post mortem interval using bioelectrical impedance analysis. Co-mentored with Dr. Melissa Connor at the Forensic Investigation Research Station. Summer semester 2017 – spring semester 2018.

Christopher Pack: Pilot investigation into local stream managed using instream flow regulations. Fall semester 2017.

- Jacob Eggers: Developing bioelectrical impedance analysis techniques. Summer semester 2016 and spring semester 2017.
- Tyler Walton: Developing bioelectrical impedance analysis techniques. Summer semester 2016.
- Kristina Morben: Developing bioelectrical impedance analysis techniques. Fall semester 2015 - spring semester 2017.
- Sophia Reck: Determining post mortem interval using bioelectrical impedance analysis. Co-mentored with Dr. Melissa Connor at the Forensic Investigation Research Station. Fall semester 2015 – spring semester 2017.
- Ashley Straub: Bullfrog diet analysis. Co-mentored with Dr. Paul Hampton. Fall semester 2015.
- Brandon Adams: Statistical analysis of a mosquito control experiment. Co-mentored with Dr. Margot Beckett and Zane McCallister with the Mosquito Control Program. Fall semester 2015.
- Mackenzie Eikamp: Soil lipids contributions from human decomposition. Co-mentored with Dr. Kim White and Dr. Melissa Connor at the Forensic Investigation Research Station. Fall semester 2015.
- Gemma Heimlich-Bowler: Determining post mortem interval using bioelectrical impedance analysis. Co-mentored with Dr. Melissa Connor at the Forensic Investigation Research Station. Spring semester 2015.
- Kristine Crippen: Developing bioelectrical impedance analysis techniques for Catostomidae and Cyprinidae. Fall semester 2014 - fall semester 2015.
- Sol Rouen (Master's student at Wesleyan University, Omaha Nebraska): Determining post mortem interval using bioelectrical impedance analysis. Co-mentored with Dr. Melissa Connor at the Forensic Investigation Research Station. Fall semester 2014 - fall semester 2015.
- Mike Partlow: Predicting fish movement through two selective fish ladders in the Grand Valley, Colorado. In cooperation with the U. S. Fish and Wildlife Service, Upper Colorado River Basin Recovery Program, Grand Junction Colorado River Fishery Project. Spring semester 2015.
- Keila Utu: Meristics and morphometrics of the *Cottus bairdii* complex: re-describing *C. annae*. In collaboration with Dr. John Woodling. Fall semester 2014 - summer 2015.

Amanda Schrager Lavelle, Ph.D.

alavelle@coloradomesa.edu

(970) 248-1761

Biology Department, Colorado Mesa University

EDUCATION

- 2008 - 2016 *Doctor of Philosophy, Plant Biology*
University of California, Davis
Dissertation: "Unraveling the Genetics of Internode Elongation."
- 2001 - 2005 *Bachelor of Science, Biological Science*
University of California, Davis

TEACHING EXPERIENCE

- Fall 2018 -
current *Assistant Professor, Colorado Mesa University, Grand Junction, CO.*
Tenure-track assistant professor. Courses include BIOL 101/L lecture and lab for non-majors, BIOL 105/L introductory biology lecture and lab for majors, BIOL 310L Genetics lab, and BIOL 310/L Developmental Biology lecture and lab.
- Fall 2017 *Associate Instructor, University of Massachusetts Amherst.*
Mechanisms in Plant Development, Biology 791D. A graduate level seminar course covering recent literature in plant evolutionary development.
- Fall 2016 *Guest Lecturer, University of Massachusetts Amherst.*
Developmental Biology, Biology 580. An upper division course for biology majors.
- Fall 2015 –
Summer 2016 *Adjunct Assistant Professor, American River College, Sacramento, CA.*
General Biology, BIOL 310. A transfer level lab and lecture course for non-science majors.
- Spring 2016 *Adjunct Assistant Professor, Yuba College, Marysville, CA.*
Bioscience, BIOL 15. An introductory lab and lecture course for pre-health science majors and non-majors.
- Spring 2015 *Associate Instructor, University of California, Davis.*
Plant Molecular Biology, PLB 113. An upper division course for biology majors.
- 2013 - 2014 *Guest Lecturer, University of California, Davis.*
Plant Molecular Biology, PLB113, Spring 2013 and Spring 2014.
Plant Development, PLB112, Winter 2014.
PLB 112 and PLB 113 are upper division classes for biology majors.
- 2010 - 2014 *Graduate Teaching Assistant, University of California, Davis.*
Plant Molecular Biology, PLB113, Spring 2014, 2013, 2012, and 2010.
Plant Development, PLB112, Winter 2014.
Genes and Gene Expression, BIS101, Fall 2013 and Fall 2014
Led several discussion sections a week, held office hours, and graded homework and exams.
Upper division classes for biology majors.

RESEARCH EXPERIENCE

- 2016 - 2018 *Postdoctoral Fellow*, Biology Department, University of Massachusetts Amherst
Research on the evolution of gene regulation through a project on protein dimerization within the B-class MADS box transcription factors in the grasses.
Advisor: Dr. Madelaine Bartlett
- 2009 - 2015 *Graduate Student Researcher*, Department of Plant Biology, University of California, Davis
Dissertation research utilizing forward and reverse genetic approaches to understand the molecular and genetic basis of internode elongation and competition for light resources in tomato.
Advisor: Dr. Julin Maloof
- 2006 - 2008 *QA/R&D/Manufacturing Associate*, Expression Systems, Woodland, CA
Responsibilities spanned all departments in the company including manufacturing, research and development, and writing and approval of controlled documents for a GMP manufacturing facility.
- 2005 - 2006 *Senior Lab Technician*, Dade Behring, West Sacramento, CA
Assisted with failure investigation of Dade Microscan microbial diagnostic panels, microbial testing, and general microbiology lab chores.

RESEARCH MENTORSHIP

- 2019 - current *Undergraduate Research Mentor*, Colorado Mesa University.
- 2017 - 2018 *High School Student Research Mentor*, University of Massachusetts, Amherst.
- 2016 - 2018 *Undergraduate Research Mentor*, University of Massachusetts, Amherst
- 2011 - 2015 *Undergraduate Research Mentor*, University of California, Davis
- Summer 2011 *High School Student Research Mentor*, Young Scholars Program, University of California, Davis. The Young Scholars Program is designed to engage high achieving high school students in university coursework and research.
- Summer 2010 *Laboratory Course Assistant*, Frontiers and Techniques in Plant Science, Cold Spring Harbor, NY

OUTREACH

- 2017 *Science Mentor*, Planting Science
Planting Science is an online platform providing inquiry based learning in plant biology for middle and high school students.
- Summers 2009 - 2013 *Community College Student Teaching and Research Mentor*, Tomato Genome Internship Program, University of California, Davis.
Designed and led lectures and lab sessions on DNA fundamentals and lab techniques as part of a ten-week internship for underrepresented community college students.

PROFESSIONAL DEVELOPMENT

- 2017 - 2018 *Co-chair, Gordon Research Seminar*
A two-day meeting for early career scientists associated with the 2018 Gordon Research Conference on Plant Molecular Biology.
- 2014 - 2015 *Faculty Diversity Internship Program, Los Rios Community College District, CA*
Internship program included a course on curriculum, assessment, teaching methods, classroom strategies, and learning styles along with hands-on experience in a biology class with a faculty mentor for a semester.
- 2012-2013 *Graduate Teaching Community, University of California, Davis.*
An interdisciplinary group of graduate students and postdocs interested in teaching.
- 2012 *Teaching Assistant Training Practicum, University of California, Davis.*
A seminar style course on effective teaching strategies for graduate teaching assistants.
- 2010 *Instructor Development Series, University of California, Davis.*
A six-week workshop series on active learning, course design, and teaching methods to prepare students and postdocs to teach their own courses.

RESEARCH PRESENTATIONS AND POSTERS

* Undergraduate author

- 2019 *Poster: Leveraging genetics and genomics for an in-depth understanding of lodicule development in grasses.* Amanda Schrager Lavelle, Jasmín Abraham, Courtney Babbitt, and Madelaine Bartlett.
American Society of Plant Biology Annual Meeting, Tuscon, AZ.
- 2018 *Poster: Variable dimerization of maize B-Class MADS box transcription factors and the evolution of gene regulation.* **Amanda Schrager Lavelle**, Jazmín Abraham, Pubudu Handakumbura, Jarrett Man, Grace Pisano*, Courtney Babbitt, Madelaine Bartlett.
Gordon Seminar and Conference on Plant Molecular Biology, Holderness, NH.
- 2017 *Poster: "Variable dimerization of maize B-Class MADS box transcription factors and the evolution of gene regulation.*
Amanda Schrager Lavelle, Pubudu Handakumbura, Jarrett Man, Grace Pisano*, Edgar Demesa Arevalo, David Jackson, Courtney Babbitt, Madelaine Bartlett.
FASEB conference on Mechanisms in Plant Development, Saxons River, VT.
- 2017 *Poster: "Variable dimerization of maize B-class MADS box transcription factors."*
Amanda Schrager Lavelle, Pubudu Handakumbura, Jarrett Man, Edgar Demesa Arevalo, Dilay Ayhan, David Jackson, Courtney Babbitt, Madelaine Bartlett.
Northeast American Society for Plant Biology regional meeting, New Haven, CT.
- 2013 *Talk: "Unraveling the Genetics of Internode Elongation."*
Plant Cell Retreat, Asilomar, CA
- 2012 *Poster: "Tomato Shade Avoidance: A Forward and Reverse Genetic Approach."*
Amanda V. Schrager and Julin N. Maloof.
Gordon Research Conference on Plant Molecular Biology, Holderness, NH
- 2012 *Talk: "Tomato Shade Avoidance: A Forward and Reverse Genetic Approach."*

Tuesday Seminar Series in Plant Biology, University of California, Davis

- 2011 *Poster: "Methods for Studying the Phytochrome Signaling Network in Solanum lycopersicum," Amanda V. Schrager and Julin N. Maloof.*
- 2010 *Talk: "Characterizing Shade Avoidance in Solanum lycopersicum."*
Plant Cell Retreat, Asilomar, CA

ACADEMIC SERVICE

- 2018 *NSF panel reviewer*
- 2016 - 2017 *Reviewer*
Frontiers in Plant Science
Journal of Integrative Plant Biology
- 2013 - 2014 *Member, Plant Biology Seminar Committee. University of California, Davis.*
- 2010 - 2013 *Treasurer/Secretary, Plant Biology Graduate Group Executive Committee*
University of California, Davis

FELLOWSHIPS AND AWARDS

- 2017-2018 *USDA-NIFA Postdoctoral fellowship. Research award, \$160,000.*
"Towards fine-tuning flower architecture: Leveraging comparative genomics and genetics for in-depth understanding of grass flower development."
- 2013 *Elsie Taylor Stocking Memorial Fellowship. Research award, \$3,500.*
- 2012 *Gordon Research Conference Travel Award. Travel award, \$1,000.*
- 2011 *Elsie Taylor Stocking Memorial Fellowship. Travel award, \$1,200.*

PUBLICATIONS

* Undergraduate author ♦ Undergraduate honors thesis

Amanda Schrager-Lavelle, Natalie N. Gath*, Upendra Kumar Devisetty, Miguel A. Blazquez, and Julin N. Maloof (2019). The role of a class III GA2 OXIDASE in tomato internode elongation. *The Plant Journal*. doi:10.1111/tpj.14145.

Amanda Schrager-Lavelle, Harry Klein, Amanda Fisher, Madelaine Bartlett (2017). Grass flowers: an untapped resource for floral evo-devo. *Journal of Systematics and Evolution*. doi:10.1111/jse.12251.

Amanda Schrager-Lavelle, Leslie A. Herrera*, and Julin N. Maloof (2016). Tomato phyE is required for shade avoidance in the absence of phyB1 and phyB2. *Frontiers in Plant Science* 7:1275. doi:10.3389/fpls.2016.01275

Leslie A. Herrera*♦, **Amanda Schrager Lavelle**, and Julin N. Maloof (2015). Candidate genes necessary for shade avoidance in *Solanum lycopersicum* revealed by forward genetic mutant screen. University of California, Davis Undergraduate Honors Thesis.

Rubén Rellán-Álvarez, Guillaume Lobet, Heike Lindner, Pierre-Luc Pradier, Muh-Ching Yee, Jose Sebastian, Yu Geng, Charlotte Trontin, Therese LaRue, **Amanda Schrager-Lavelle**, Cara Haney, Rita Nieu,

Julin Maloof, John P. Vogel, José R. Dinneny (2015). Multidimensional mapping of root responses to soil environmental cues using a luminescence-based imaging system. *eLife* 2015;4:e07597

Natalie N. Gath*♦, **Amanda V. Schrager**, and Julin N. Maloof (2013). Uncovering Novel Genes Related to Internode Elongation and Heightened Shade Avoidance Response in *Solanum lycopersicum*. University of California, Davis Undergraduate Honors Thesis.

Chitwood, D.H., Headland, L.R., Filiault, D.L., Kumar, R., Jimenez-Gomez, J.M., **Schrager, A.V.**, Park, D.S., Peng, J., Sinha, N.R., and Maloof, J.N. (2012). Native environment modulates leaf size and response to simulated foliar shade across wild tomato species. *PLoS One* 7, e29570.

A. Carrera, V. Echenique, W. Zhang, M. Helguera, F. Manthey, **A. Schrager***, A. Picca, G. Cervigni and J. Dubcovsky (2007). A deletion at the Lpx-B1 locus is associated with low lipoxygenase activity and improved pasta color in durum wheat (*Triticum turgidum* ssp. durum). *Journal of Cereal Science* 45(1):67-77.

Denise S. McKenney, Ph.D.
Department of Biological Sciences
Colorado Mesa University
Grand Junction, Colorado

Education:

PhD, Microbiology, North Carolina State University, 1986
Secondary Education Certification in Biology and Chemistry, New Mexico State University,
1979
BS in Biology, New Mexico State University, 1978

Teaching:

BIOL 105 Attributes of Living Systems
BIOL 105L Attributes of Living Systems Laboratory
BIOL 250 Introduction to Microbiology
BIOL 250L Introduction to Microbiology Lab
BIOL 301 Genetics
BIOL 301L Genetics Laboratory
BIOL 350 Microbiology
BIOL 350L Microbiology Laboratory
BIOL 425 Molecular Biology
BIOL 493 Senior Thesis
BIOL 496 Topics in Virology

Evidence of Continuous Improvement

Paul Gaston Degree Qualifications Profile, January 5-6, 2012
Patty Phelps Restoring the Joy of Teaching and Ways to Promote Learning, January 16, 2010
Barbara Millis Course Redesign and Revitalization, January 16, 2009
Ed Neal Critical Thinking, May 1-2, 2008
Diane Nyhammer Assessment, January 2008
Linda Neilson Workshops, May 3-4, 2007

Supervision of Student Research/Project(s)

Nitrogen fixation in cave bacteria, supervised one student, 2006
Supervised two student investigating nitrogen fixation genes from samples collected from the
Spring Cave. Soil samples were plated on TSA agar, DNA isolated and PCR analysis
performed with 16S rRNA primers, 2005
Initiated research on nitrogen ecology in cave bacteria, supervising one student, 2004

Scholarship and Creative Work:

Scholarship Related to Pedagogy in Discipline

Lab Manual: BIOL 105L Attributes of Living Systems Laboratory Manual, FountainHead Press,
2006
Updated editions of lab manual most years

Professional Memberships

Sigma Xi
American Society for Microbiology

Service 2003-Present:

University

Appeals committee
MASH camp presenter 2008, 2009
Search committee member for Teacher Education, 2008

Department

Department Head 2005-2016
Laboratory coordinator for all sections of BIOL 105L Attributes of Living Systems Laboratory,
2005-present Pre-med club co-advisor, 2003-2005

Community

Saccomanno Research Institute Oversight Committee, 2003-present

Local

Science Fair Judge: 2003-present
Science Fair Committee: working with District 51, 2005-2006

Advising:

Multiple SOAR and advising sessions: every year
About 30 advisees each year

Professional Experience:

Department Head of Biological Sciences
Colorado Mesa University, Grand Junction, Colorado
August 2005-2016

Professor. Department of Biological Sciences
Colorado Mesa University, Grand Junction, Colorado
August 1996-present

Kyle J. McQuade, Ph.D.

Associate Professor of Biology
Colorado Mesa University
1100 North Avenue
Grand Junction, CO 81501
970.248.1650
kmcquade@coloradomesa.edu

EDUCATION and EXPERIENCE

Colorado Mesa University, Grand Junction, CO

- Professor of Biology 2019-present
- Associate Professor of Biology 2013-2019
- Assistant Professor of Biology 2006-2013

Princeton University, Princeton, NJ.

2003-2006

- Postdoctoral teaching and research fellow, Department of Molecular Biology and Council for Science and Technology

University of Wisconsin-Madison, Madison, WI.

2003

- Ph.D. in Cellular and Molecular Biology

Millikin University, Decatur, IL.

1996

- B.S. in Biology and Chemistry, *magna cum laude*

TEACHING

TEACHING EXPERIENCE

Colorado Mesa University.

2006-present

Postdoctoral Teaching Fellow. Princeton University.

2003-2006

Research Mentor for Undergraduates, Princeton University.

2004-2005

Teaching Assistant. University of Wisconsin-Madison.

2001

Research Mentor for Undergraduates. University of Wisconsin.

2000-2001

Rotation Mentor. University of Wisconsin.

1997-2001

TEACHING INTERESTS

- Implementing novel, inquiry-driven experimentation in the teaching laboratory
- Using the primary literature as a teaching tool
- Emphasizing the importance of writing in science

COURSES TAUGHT

- General Human Biology Laboratory BIOL101L
- Attributes of Living Systems – BIOL105/BIOL105L
- Quantitative Molecular Biology – MOL215 (at Princeton University)
- Cellular Biology – BIOL302/BIOL302L

- Immunology – BIOL343/BIOL343L
- ‡Forensic Molecular Biology – BIOL344/BIOL344L
- ‡Laboratory Investigations in Cellular and Molecular Biology – BIOL371L
- Structured Research – BIOL387
- Topics: Cancer Biology – BIOL396
- Molecular Genetics – BIOL425
- Endocrinology – BIOL441
- Senior Thesis – BIOL483
- Senior Research – BIOL487
- Lab Teaching Practicum – BIOL493
- ‡Current Topics in Biomedical Research – BIOL496
- Methods in Teaching Secondary Science – EDUC497D
- ‡Middle School Biology – EDUC596
- ‡ new course developed at Colorado Mesa University

RESEARCH/SCHOLARLY ACTIVITY

RESEARCH EXPERIENCE

Undergraduate Research Mentor. Colorado Mesa University.	2006-present
Post-doctoral Research. Princeton University.	2003-2006
Doctoral Thesis Research. University of Wisconsin.	1997-2003
Undergraduate Thesis Research. University of Wisconsin.	1995-1996
Undergraduate Research Project. Carnegie Mellon University.	1994

RESEARCH INTERESTS

- Understanding interactions of amoebae with other soil microbes
- Identification and characterization of bioactive natural compounds
- Characterization of the molecular machinery controlling cell motility and metastasis
- Regulation of G-protein signaling
- Mechanisms of protein localization
- Drug discovery and characterization
- Training students in the mechanisms of scientific inquiry

RESEARCH STUDENTS MENTORED AT CMU

- Larissa Umberger – 2019-present – Effect of secondary metabolites in soil on the social amoebae
- Christian Cherry – 2019-present – Interactions between *Dictyostelium* and soil fungi
- Bryce Hopwood – 2018-present – Interactions between *Dictyostelium* and Streptomyces
- Brandon Valerio – 2018-present – Effects of Carnosol on the *Dictyostelium* life cycle
- Marisa Bickel – 2018 – Identifying interactions between *Dictyostelium* and other soil eukaryotes
- Thomas Stutzriem – 2017-present – Does *Dictyostelium* consume spores from Rhizopus
- Rachael Holm – 2017-2018 – Understanding phagocytosis in *Dictyostelium*
- Cambria Camp – 2017 – *Dictyostelium* as a tool to assess environmental toxicity
- Josh Shettler – 2017-present – *Dictyostelium*: A tool to screen compound libraries
- Molly Kubesh – 2016 – Carnosic Acid alters development in *Dictyostelium*

- Amber Gillard – 2016 – Assessing the effects of natural compounds on *Dictyostelium* development
- Olivia Sayer – 2015-2016 – Developing automated methods to measure cell growth in *Dictyostelium*
- Jessah Skalla – 2015-2016 – Measuring Motility of *Dictyostelium* in the presence of natural compounds
- Andy Ogrodny – 2015 – Using ICY cell analysis software to quantify motility in *Dictyostelium*
- Rebecca Bryan – 2015 – Measuring Cell Growth in the presence of natural compounds
- Jennifer Rose – 2014-2015 – Expressing GFP-labeled signaling proteins in *Dictyostelium*
- Melissa Lindt – 2014-2015 – Expressing GFP-labeled signaling proteins in *Dictyostelium*
- Meg Margeson – 2014– Characterizing antiproliferative effects of Differentiation Inducing Factors
- Kevin Wernke – 2013-2016 – *Dictyostelium* chemotaxis as a drug discovery tool
- Kayt Hawley – 2013-2014 - *Dictyostelium* chemotaxis as a Tool to Characterize Bioactive Natural Compounds.
- Sunni Rae Baird – 2012-2013 – The effects of EGCG on Morphogenesis in *Dictyostelium*
- Sarah Wood – 2012-2013– Effects of EGCG on Cell Motility
- Tim Moore – 2011-2012 – Using *Dictyostelium* as a screening tool for Bioactive Natural Compounds
- April Ilacqua – 2011-2013 – Characterizing the Effects of EGCG in *Dictyostelium*
- Sarah Wilson – 2010-2011 - Effects of Green Tea Extracts on *Dictyostelium* Growth
- Tina Peltier – 2010-2012– Effects of Green Tea Extracts on *Dictyostelium* Development
- Joshua Bollan – 2008-2010 -Role of G-protein methylation in endocytosis
- Julie Fritz – 2008 – 2010- Role of G-protein methylation in cytokinesis
- Kathryn Bailey – 2007-2010 – Role of G-protein methylation in *Dictyostelium* chemotaxis
- Shannon Piersall – 2008 – Role of G-protein methylation in endocytosis
- Brad Winters – 2007-2008 - Role of isoprenylcysteine methylation of G-protein localization
- Everett Austin – 2006-2007 – Role of heparan-sulfate proteoglycans in keratocyte motility

PEER-REVIEWED RESEARCH PUBLICATIONS

- [‡]Ilacqua AN, Shettler JA, Wernke KM, Skalla JK, McQuade KJ. Theaflavins from black tea affect growth, development, and motility in *Dictyostelium discoideum*. *Biochem Biophys Res Commun*. 2017 Sep 16;491(2):449-454. doi: 10.1016/j.bbrc.2017.07.058. Epub 2017 Jul 12.
- [‡]McQuade, K.J, Nakajima, A., Ilacqua, A.N., Shimada, N. and S. Sawai. 2013. The green tea catechin epigallocatechin gallate (EGCG) blocks cell motility, chemotaxis and development in *Dictyostelium discoideum*. *PLOS ONE*. 8: 3. e59275.
- [‡]Chen, Y.*, McQuade, K. J.*, Guan. X. J., Thomason, P. A., Wert, M. S., Stock, J. B. and E. C. Cox. 2007. Isoprenylcysteine carboxyl methylation is essential for development in *Dictyostelium discoideum*. *Mol. Biol. Cell*. **18**: 4106-4118.
- McQuade, K. J.*, Beauvais, D.M.*, Burbach, B.J. and A. C. Rapraeger. 2006. Syndecan-1 regulates $\alpha_5\beta_1$ integrin activity in B82L fibroblasts. *J. Cell Sci*. **119**: 2445-56.
- McQuade, K. J. and A. C. Rapraeger. 2003. The syndecan-1 transmembrane and extracellular domains have unique and distinct roles in cell spreading. *J. Biol. Chem*. **278**: 46607-15.
- Lebakken, C. S., McQuade, K. J. and A. C. Rapraeger. 2000. Syndecan-1

signals independently of β_1 integrins during raji cell spreading. *Exp. Cell Res.* **259**: 315-325.
Svitkina, T., Verkhovsky, A., McQuade, K. and G. Borisy. 1997. Analysis of
the actin-myosin II system in fish epidermal keratocytes: mechanism of cell body translocation.
J. Cell Biol. **139**: 397-415.

‡ published while at Colorado Mesa University

* co-first authors

CMU Student researchers are underlined

PUBLISHED ABSTRACTS

‡McQuade, K.J, Nakajima, A., Ilacqua, A.N., Shimada, N. and S. Sawai. 2012.

Epigallocatechin-3-gallate (EGCG) blocks development of *Dictyostelium discoideum*. *Mol Biol Cell* .23 (supplement), Abstrack 904.

‡McQuade KJ, Bollan J, Bailey K, Fritz J 2011. Isoprenylcysteine methylation is required for growth and endocytosis in *Dictyostelium discoideum*. *Mol Biol Cell*. 22 (supplement). Abstrack 2036.

‡Bollan, J., Bailey, K., Fritz, J., and K.J. McQuade. 2010. Isoprenylcysteine methylation is required for normal growth and endocytosis in *Dictyostelium*. *The Journal of the Colorado-Wyoming Academy of Science*. **40**: 5. (abstrack)

McQuade, K. J. and A. C. Rapraeger. 1999. Syndecan-1 mediates filopodial extension in B82L fibroblasts. *Mol. Biol. Cell*. **10s**: 451a. (abstrack)

Svitkina, T., Verkhovsky, A., McQuade, K. and G. Borisy. 1996. Organization and dynamics of myosin II in locomoting and stationary fish epidermal keratocytes. *Mol. Biol. Cell*. **7s**: 560a. (abstrack)

Verkhovsky, A., Svitkina, T., McQuade, K. and G. Borisy. 1996. Polarity of fish epidermal keratocytes. *Mol. Biol. Cell*. **7s**: 231a. (abstrack)

‡ published while at Colorado Mesa University

CMU Student researchers are underlined

DOCTORAL THESIS

McQuade, K. J. 2003. Roles of **syndecan-1** in cell adhesion and signaling. doctoral thesis – University of Wisconsin-Madison.

PUBLISHED ESSAYS

‡Four short essays have been published in Salem Health:Cancer, an encyclopedia for patients. The encyclopedia was published in 2008.

Amyloidosis

APC gene testing

DPC4 gene testing

HRAS gene testing

in: Knight, White-Ryan and Jackson-Grusby. Salem Health:Cancer. Pasadena, CA: Salem Press, 2008.

‡Two short essays have been published in Salem Health:Genetics and Inherited Disorders. The encyclopedia was published in 2010.

Gm1-gangliosidosis
Wiskott-Aldrich syndrome

PATENTS

- †Cox, E.C., Stock, J.B., Chen, Y., McQuade, K.I. and S. Sawai. Integrated Screening Assays and Methods of Use. Published by US Patent and Trademark Office, Mar 4, 2010. Publication number US 2010/0056391 A1.
‡ submitted while at Colorado Mesa University

POSTER PRESENTATIONS

- †Annual International Dictyostelium Conference, London, UK. 2015.
“EGCG affects growth and PIP3 signaling in Dictyostelium”
†Annual Meeting of the American Society for Cell Biology, San Francisco, CA. 2012.
†Annual Meeting of the American Society for Cell Biology, Denver, CO. 2011.
Isoprenylcysteine methylation is required for growth and endocytosis in *Dictyostelium discoideum*. Mol Biol Cell 22, 4705 (abstract 2036).
†Annual International Dictyostelium Conference, Estes Park, CO. 2009.
Isoprenylcysteine methylation is required for normal growth and endocytosis in *Dictyostelium*.
Meeting of the American Society for Matrix Biology, Houston, TX. 2002.
The syndecan-1 transmembrane domain signals spreading via a mechanism involving lipid rafts.
Meeting of the American Society for Cell Biology, Washington, D. C. 1999.
Syndecan-1 mediates filopodial extension in B82L fibroblasts.
† presented while at Colorado Mesa University

PRESENTATIONS by CMU STUDENT RESEARCHERS

- Molly Kubesh – CMU Student Showcase - 2018
Jessah Skalla – CMU Student Showcase – 2016 – (1st place oral presentation)
Olivia Sayer – CMU Student Showcase - 2016
Kevin Wernke – BIOSINQ – Biology Department Dinner/Fundraiser – 2015
April Ilacqua - TriBeta Regional Conference – Colorado Mesa University –
2013 (2nd place poster presentation)
-TriBeta National Conference – San Juan, PR – 2012
(2nd place oral presentation)
- TriBeta Regional Conference – Adams State College –
2012 (2nd place oral presentation)
- CMU Student scholars symposium, 2012 (1st place oral
presentation)
Sarah Wood - CMU Student Showcase - 2013
- TriBeta Regional Conference – Colorado Mesa University – 2013
Sunni Baird - TriBeta Regional Conference – Colorado Mesa University – 2013
Tina Peltier - TriBeta Regional Conference – Western State College – 2011
Sarah Wilson - TriBeta Regional Conference – Western State College – 2011
Joshua Bolla - Colorado and Wyoming Academy of Science Annual
Meeting – Mesa State College – 2010
Julie Fritz - TriBeta Regional Conference – Western State College – 2011
- TriBeta Regional Conference – Mesa State College – 2010
(poster – 2nd place award)

- Western Regional Honors Council Conference –
Spokane, WA, 2009
- TriBeta Regional Conference – Ft. Lewis College, 2009 (2nd place oral presentation)
- MSC Student scholars symposium, 2009
- Katie Bailey - TriBeta Regional Conference – Ft. Lewis College, 2009
- Brad Winters - TriBeta Regional Conference – CSU-Pueblo, 2008
- MSC Student Scholars Symposium, 2008
- Everett Austin – MSC Student Scholars Symposium, 2007

FUNDING at COLORADO MESA UNIVERSITY

Grants Awarded:	amount received
National Science Foundation-Major Research Instrumentation – Awarded September, 2009 – AWARD #0923233 – Principal Investigator	\$265,201
National Science Foundation-Major Research Instrumentation -R ² – MRI-R2: Acquisition of a Digital Stereomicroscopy System for Research, Research Training and the Integration of Research and Education at Mesa State College. Awarded April, 2010. AWARD #0960178. Principal Investigator	\$23,055
Saccomanno Higher Education Foundation – Summer Internship in Biological Research – 2012 - present	\$271,575
American Philosophical Society – Franklin Grant – 2008 - Principal Investigator	\$5,000
CMU Faculty Professional Development Award –2007-2008	\$2,183
	\$1,280
CMU Faculty Professional Development Award – 2009-2010	\$3,000
CMU Faculty Professional Development Award – 2010-2011 (co-principle investigator)	\$2,220
CMU Faculty Professional Development Award – 2011-2012	\$2,466
	\$1986
CMU Faculty Professional Development Award – 2012-2013	\$2069
CMU Faculty Professional Development Award – 2013-2014	\$2000

CMU Faculty Professional Development Award – 2014-2015	
CMU Faculty Professional Development Award – 2017-2018	

Unfunded Proposals:

amount requested

National Science Foundation-Major Research Instrumentation – co-Principal Investigator	\$363,793
American Society of Pharmacognosy – Research Starter Grant – Spring 2011	\$4300
Boettcher Foundation – Webb-Waring Biomedical Research Awards Early Investigator Program – April 2010	\$255,000
Research Corporation – CCSA – Fall 2008	\$25,572

Undergraduate Research Awards:

amount received

Brad Winters, 2007-2008	
Tri-Beta Research Scholarship - 2007	\$560
Sigma Xi Grant in Aid of Research - 2007	\$730
Katie Bailey, 2008- 2010	
Tri-Beta Research Scholarship - 2008	\$400
Julie Fritz, 2008- 2010	
Tri-Beta Research Scholarship - 2010	\$425
Tri-Beta Research Scholarship - 2009	\$450
Tri-Beta Research Scholarship – 2008	\$400
Sarah Wilson, 2010-2011	
Tri-Beta Research Scholarship – 2010	\$450
Tina Peltier, 2010-2011	
Tri-Beta Research Scholarship – 2010	\$425
April Ilacqua – 2011-	
Tri-Beta Research Scholarship – 2012	\$408
CMU Biology Student Research Award – 2011	\$408
Tri-Beta Research Scholarship – 2011	\$650
Tim Moore – 2011	
CMU Biology Student Research Award – 2011	\$650
Sarah Wood - 2012	
Tri-Beta Research Scholarship – 2012	\$548

Sunni Rae Baird – 2012 Tri-Beta Research Scholarship – 2012	\$303
Kevin Wernke Tri-Beta Research Scholarship – 2014	\$400
Melisa Lindt Tri-Beta Research Scholarship – 2014	\$400
Olivia Sayer Tri-Beta Research Scholarship – 2014	\$525

Funding Summary

Awards Received at CMU: \$582,035
Awards Granted to Undergraduate Researchers: \$8,132

SERVICE

CAMPUS COMMITTEES

Assessment Committee, 2007-2013
Academic Technology Advisory Council, 2009-present
Academic Dishonesty Committee – July 2010, December 2015
Biology/PES Scholarship Committee – 2011-2016
HLC Reaccreditation Committee – academic rigor – 2011-2012
HLC Reaccreditation Committee – Category 2 – 2015-2016
General Education Revision Committee – 2012-2013
Essential Learning Committee – 2014-present
Milestone Development subcommittee – 2014
Quantitative Learning Enhancement subcommittee - 2015
PreTenure Review – 2015 – present
Tenure and Promotion – 2016-2017

HIRING COMMITTEES

Cellular and Molecular Biology, 2017 - chair
Biochemistry, 2017
Microbiology Search, 2016 - chair
Molecular Genetics Job Search, 2014
Chemistry Job Search, 2014
Biochemistry Job Search, 2011
Developmental Biology Job Search, 2011
A&P Biology Job Search - chair (two positions), 2010
Analytical Chemistry Job Search, 2008
Plant Biology Job Search, 2007

BIOLOGY DEPARTMENT COMMITTEES

Masters Degree exploratory committee
Department Representative - APQPP Programs of Distinction Action Plan, 2009
Curriculum Review Committee, 2007

CAMPUS SERVICE

Faculty Co-advisor, Biology Club 2008-2013

Organizer – Biology Department Faculty/Student Research Meetings, 2008-2010

Secretary – Sigma Xi National Research Society, Mesa State College Chapter, 2008-2010

Guest Lecturer in General Organismal Biology Lab 2007, 2011, 2012; Criminalistics

2007, 2010; Mycology 2009, 2011, 2013, 2015, 2017; Molecular Cloning 2010; Genetics 2011, Astronomy 2014, 2016, 2017

Guest Lecturer in 2013 CMU Physics Symposium, 2018 Physics Symposium

CMU presentations

2016 BIOSINQ – Multiple Organisms mixer, 2017 – GEMS research meeting

Judge, 2008 Student Scholars Symposium

Panelist, CMU New Faculty Orientation Teaching Effectiveness Panel Discussion, 2013

OUTREACH, COMMUNITY SERVICE, PROFESSIONAL SERVICE

Reviewer – PLOS One – 2015, Toxicology Research 2016

ORAU – ad hoc reviewer for proposals from Nazarbayev University – 2014, 2017

NSF Review Panelist - 2013

Reviewed Principles of Life by Hillis, Sadava, Heller and Price - professional review for Sinauer and Associates - 2013

Selection Committee – Saccamanno Research Institute Internship, 2011-2018

Reviewed Biology by Brooker, Widmair, Graham and Stiling – professional review for McGraw-Hill Publishing - 2011

Taught in MS3 Program – training for District 51 master teachers – 2010-2011

Local Scientific Member – St. Mary's Regional Medical Center – Institutional Biosafety Committee, 2010

Science Fair Judge

Wingate Elementary School 2007

Western Colorado Science Fair 2007 – 2008, 2010

Judge for Tri-Beta Regional Meeting

Oral Presentations – 2008 meeting at CSU-Pueblo

Poster Presentations – 2009 meeting at Ft. Lewis College

Poster Presentations – 2012 meeting at Adams State College

Presented research talk to FMHS AP Biology students – 2010

Presented research talk to GJHS AP Biology students - 2009

ADVISING

New Student Advising sessions

August 3, 2018

June 16, 2017

June 12, 2015

May 16, 2014

July 22, 2011

May 20, 2011

November 20, 2010

May 28, 2010

May 2, 2009
April 25, 2009
June 6, 2008
May 30, 2008
August 10, 2007
July 20 2007
December 2, 2006

ACADEMIC ADVISING

- I am currently primary academic advisor for approximately 70 biology majors.
- I regularly meet with students to discuss course selection and academic planning.
- I e-mail all of my advisees each semester to encourage them to meet with me.

CAREER COUNSELING

- I have provided informal career counseling to numerous biology students including research students, advisees and others who are not my assigned advisees.

LETTERS OF RECOMMENDATION

- I have submitted more than 150 letters of recommendation for students seeking admission to medical school, the nursing and teacher education programs, summer undergraduate research programs, intramural and extramural scholarships, etc.

AWARDS

CMU Distinguished Faculty Award – 2013
CMU Exemplary Performance Rating – 2009, 2010, 2011, 2012, 2013, 2015, 2017
Excellent Rating on Faculty Personnel Ratings – 2007-2017
President's Parking Award – November 2012

VITA 2019
CARRIE MCVEAN, DVM

Department Head of Biology
Professor of Biology
Colorado Mesa University
Department of Biology
228G Wubben Science
1100 North Ave
Grand Junction, CO 81501
(970) 248-1165
cmcvean@coloradomesa.edu

Education

DVM. Doctor of Veterinary Medicine

Colorado State University
Fort Collins, CO. 80523
Graduated: May 1988
State Licenses: Colorado, previously Oregon & Nevada.
Elective courses of study include: Laboratory & exotic animal medicine

Bachelor of Science, Major: Veterinary Science

Colorado State University
Fort Collins, CO. 80523
Graduated: May 1985
Field of study: Animal Sciences and Biochemistry

Professional Working Experience

Department Head of Biology, Colorado Mesa University (F2016-present)
1100 North Ave, Grand Junction CO 81501

Professor of Biology, Colorado Mesa University (F2006-present)

Associate Professor of Biology, CMU formerly Mesa State College (F2001-2006)

Assistant Professor of Biology, School of Natural Sciences and Mathematics, MSC (F96-Sp 2001)

Instructor, School of Natural Sciences and Mathematics, Mesa State College (F94-Sp96)

Instructor, Department of Agriculture, Mesa State College (F93-Summer94)

Veterinarian, Bookcliff Veterinary Hospital (1993)

564 29 Road, Grand Junction, CO. 81501

Emergency Veterinary Clinician, Veterinary Emergency Hospital, (1992-93)

2050 Centennial Boulevard, Eugene, Oregon, 97410 (503) 485-0932

Relief Veterinarian, Self employed in Portland, Oregon. (1991-92)
2062 NW Marshall, Portland, Oregon 97209 9/91-7/92

Clinical Veterinarian and Manager, Animal Medical Clinic (1989-91)
1411 SW 14th, Portland, Oregon, 97202 (503) 222-1254

Clinical Veterinarian, Tropicana Veterinary Clinic, (1988-89)
2385 E. Tropicana, Las Vegas, Nevada, 89119 (702) 736-4944

Undergraduate Supervised College Teaching, Colorado State University (Sp84)

Courses Taught

Biol 101, General Biology Lecture and Laboratory

Introductory Biology course required as an essential learning course for non-biology majors.

Biol 209/141 Human Anatomy and Physiology Lecture and Lab I

Introductory course which covers physiology of human organ systems. The laboratory teaches anatomy of human and cat organ systems.

Biol 210/145 Human Anatomy and Physiology Lecture and Lab II

Second semester course of A&P which covers immune, endocrine and histology.

Biol 241, Pathophysiology

Study of disease processes, causes of cell injury and organ system injury.

Biol 250 General Microbiology lecture and laboratory

Essential learning course required by the Nursing degree. Course explores prokaryotic organisms, Genetics, laboratory tests and disease causing agents. Practical laboratory on bacterial properties, sterile techniques for microbiological handling and safety..

Biol 385 Nature and Philosophy of Science - Course required for Teacher education which reviews the history of scientific discovery and examines controversial science.

Biol 396-Topics on AIDS

Course covers biology of HIV, course of the disease, risk factors and prevention

Biol 416/316 Ethology/Animal Behavior

Course explores the relationship between anatomical systems, genetics and other factors that influence behavior.

Agri 225, Agriculture Business Records\Analysis

Basic record keeping, balance sheets, income statements, labor costs and financial analysis,

Agri 254, Livestock Feeding and Laboratory

Animal nutrition, digestive system physiology, feed analysis and livestock diet balancing.

Agri 211, Introduction to Range Science

Range classification, soils, plant identification, stocking rate determination skills and range management practices. Laboratories involved interaction with field experts from the Soil Conservation Service & Bureau of Land Management.

Agri 265, Agricultural Marketing

Covered principles of marketing, marketing system framework, commodities marketing and putting together marketing plans.

Agri 116 Basic Agricultural Skills and Laboratory

Agricultural skills, soil assessment, livestock reproduction physiology and herd health records

Agri 101, Agricultural /Natural Resource Occupations

Career hunting skills, resume writing, assessment of personnel interests and career objectives.

Supervised Undergraduate Teaching- Advisor; Dr. John Pexton

Taught animal reproduction laboratories for the CSU Department of Animal Sciences

Continuing Education Courses

AVMA American Veterinary Medicine Association Conference Washington DC 2019

34 credits continuing education-veterinary licensure

AMI Academic Management Institute Participant 2018-19

Nominated by CMU office of Academic Affairs.

Online Teaching Essentials Course – mandatory online training for CMU faculty to Teach Quality Matters

On-line courses 2017

Collaborative institutional training (Citi)- Biomedical Responsible Conduct of research 2017

CVMA Cytopathology workshop- Colorado Veterinary medicine Association continuing education course – taught by CSU veterinary faculty in Palisade , CO 2015- 14 credits

ASLAP conference American Society of Lab Animal Practitioners, Charlotte, NC 2016- 32 credits

Pre-medical advisor training CU medical campus 2016

Create Health pre-med advisor training – CU Medical school campus, Arvada CO 2013

Foreign Animal Disease Training Course CSU campus 2013 -32 credits

ACVIM conference American College of Veterinary Internal Medicine conference, Anaheim CA 2010- 32 credits of Continuing education

ACVIM conference, Seattle Washington 2007- 32 credits

Biosafety & Biosecurity training – Four day conference covering the management and design of level 2 & 3 bio-safety level facilities. Colorado State University July 2005

AVMA American Veterinary Medicine Association Meeting –Minneapolis MN. -32 credit
To maintain Colorado Veterinary license June 2004

6th Annual Current Laboratory Animal Science Seminar & 47th Annual Pathology of Laboratory Animals(POLA), Rockville, MD 2001

American Veterinary Medical Association(AVMA) Conference, SLC, Utah, July 22-26, 2000

Biotechnology for Interdisciplinary Sciences, Northern Illinois Univ. June 4-6, 1998

Ecology of the Rockies, Mt. Evans Field station, July 26-30, 1998

Biotechnology Theory and Practice, Northern Illinois University, June 1-3, 1998

ADAM Software Grant Writing Symposium, Denver, CO 1997
Applied for \$20,000 Adam Software grant. Grant was not awarded to MSC

The Human Anatomy and Physiology Society, Toronto Canada, May 31-June 5, 1997

Diagnostics in Exotic Animal Practice, Colorado State University, June 11-13, 1997

Veterinary Emergency Care Clinicians Conference, Puerto Vallarta, Mexico. October 12-16, 1995

Cow and Calf Nutrition, Colorado State University, 1994

Computers in our Society, Mesa State College, 3 credit course 1993

Swine Artificial Insemination, Mesa State College, 1993

Veterinary Emergency Care Clinicians Conference, San Antonio, Texas. Fall 1992

Principles of Surgery, Seattle, Washington. 1991

Western States Veterinary Conference, Las Vegas, Nevada. 1990

Publications

Anatomy and Physiology Laboratory Manual 2nd edition
co-authored ; Carrie McVean Waring DVM & Craig Richard Dujay PH.D Fountainhead press 2008

Biological Experiences; A Laboratory Manual for Biology 101L Fountainhead Press 2006

Republished as:

Health and the Environment in Western Colorado

Hayden-McNeil 2nd edition 2011

MSC Animal Care Handbook

Edited handbook for IACUC Committee. 2002

Handbook contains animal use protocols and instructions for the care of animals in the facility.

Committee Memberships

Colorado Mesa University campus

Academic Council –all administrative staff

IACUC Institutional Animal Care and use Committee

CMU Handbook Committee

Faculty Senate member (multiple terms)

VP of Faculty Senate

CFAC member(Colorado Faculty Advisory Committee)

Faculty Search committees

Chaired multiple Faculty searches

Student Biology Club advisor

National Tri Beta student honor society advisor

CMU Assessment Committee Member

CMU Academic Policies Chair

CMU Safety Committee

CMU Waste Management Committee

Community

Junior Service League member

Science Fair Scientific reviewer and judge

Grand Valley Mosquito Control Board Member

Professional

Colorado State Board of Veterinarians, License 1988-Current

Continuing Education Credits-Current

DEA license for Controlled substances

ASLAP, American Society of Lab Animal Practitioners –Current

VECCS, Veterinary Emergency Care Clinicians Society 1992-1995

Grand Junction Veterinary Association 1993-1994

AVMA, American Veterinary Medical Society 1988-1989

Nevada Board of Veterinary Examiners, License 1988-1994

Oregon Board of Veterinary Examiners, License 1989-1995

SAVMA, Student American Veterinary Medical Society 1984-1988

Zeynep A. Ozsoy Bean, Ph.D.
Department of Biological Sciences
Colorado Mesa University
Grand Junction, Colorado

Education and Experience:

Instructor of Biology, Colorado Mesa University, 2010-2015
Adjunct instructor, Mesa State College, 2006-2010
Postdoctoral Scholar, University of California-Davis, 2002-2005
Ph.D., Molecular Biology and Genetics, University of North Carolina at Chapel Hill, 2002
B.S., Chemical Engineering, Bogazici University, Istanbul/Turkey, 1995

Teaching:

BIOL101 General Human Biology
BIOL101L General Human Biology Lab
BIOL105 Attributes of Living Systems
BIOL105L Attributes of Living Systems Lab
BIOL301 Principles of Genetics
BIOL301L Principles of Genetics Lab
BIOL302 Cellular Biology
BIOL396 Topics (Protein Techniques)
BIOL496 Topics (Gene Cloning Methods)
BIOL387 Structured Research
BIOL487 Advanced Research

Evidence of Continuous Improvement

November 11, 2015: Teacher to Teacher workshop, CMU Speed Dating for Milestone courses

April 10, 2015: Dr. Lesley Myers, Brainy but Balanced, how to balance work life with family and personal life workshop

March 3rd and 4th, 2015: CMU, Sexual assault, suicide prevention and campus safety training sessions

February 16, 2015: Teacher to Teacher workshop, CMU Milestone courses workshop

January 16-17, 2014: CMU, Workshop on rubrics

January 16, 2013: Patti Carlson, CMU D2L workshop

March 14, 2013: Dr. John Nicoletti Safety Training

March 19, 2013: April Cackler, CMU Advising Training for Student Orientation

April 10, 2013: Cynthia Chovich, Teacher 2 Teacher training Differentiated teaching demonstration workshop

April 16, 2013: Krystin Rose CMU D2L Training and workshop

May 28, 2013: Ann Wolf, Cengage Learning FYI Workshop

October 15, 2013: Dr. Mark Taylor, Methods for engaging NeXt generation students

November 20, 2013: Teacher 2 Teacher program What Do You Do?

August 16-17, 2012 : Dr. Ken Bain, What do the best college teachers do? Workshop

December 5, 2011: Krystin Rose, CMU Building your course in Desire2Learn

October 18, 2011: Sonia Brandon, Colorado Mesa University Learning and Study Strategies Inventory (LASSI) Implementation

September 26, 2011: Krystin Rose, CMU Introduction to Desire2Learn and Quality Matters

September 19, 2011: Claire Boulanger, Discussion on "Teaching and learning: What works for you? What doesn't?"

May 20, 2011: Ann Wolf, Cengage Learning FYI Workshop

October 21, 2010: Nancy Conklin and Javier Leung-Long, CMU Universal Design of Course Materials

Innovative Materials/Activities

Developed three topics courses: BIOL396 and 496, Protein Techniques and Gene Cloning Methods.

Supervision of Student Research/Project(s)

Supervised student research on Molecular Biology of the Tamarisk Leaf Beetle Academic year of 2010 - 2011 : 1 student

Academic year of 2011 - 2012 : 1 student

Academic year of 2012 - 2013 : 3 students

Academic year of 2013 - 2014 : 3 students

Academic year of 2014 - 2015 : 3 students

Academic year of 2015 - 2016 : 2 students

Fall of 2016: 6 students

Mentored one student each in the summer of 2015 and 2016 for the SIPBR internship.

Scholarship and Creative Work:

Journal Articles

- Amitabh V. Nimonkar, A. Zeynep Ozsoy, Jochen Genschel, Paul Modrich and Stephen C. Kowalczykowski. (2008) Human exonuclease 1 and BLM helicase interact to resect DNA and initiate DNA repair. *Proceedings of National Academy of Sciences*, **105**, 16906-16911
- A. Zeynep Ozsoy, Heather M. Ragonese and Steven W. Matson. (2003) Analysis of helicase activity and substrate specificity of *Drosophila* RECQ5. *Nucleic Acids Research*, **31**, 1554-1564

Grants

- August, 2011, 2012, 2013, 2014 and 2015 Received the Faculty Professional Development Proposal Grant for Tamarisk Beetle Molecular Biology Research
- August, 2008 Applied to 10 Gigabase Sequencing Grant Program to have the tamarisk beetle genome sequenced, but was not funded.

Professional Memberships

Member of the American Association for the Advancement of Science 2002 - present

Service:

- Spring and Fall of 2011, 2012 and 2013, Spring of 2014 and Fall of 2015: Coordinator for BIOL101 Labs
- Spring and Fall of 2016 Coordinator for BIOL301 Labs
- 2015-2016 academic year: member of the HLC - Criterion 4 committee Scientific community
- 2010, 2014 Referee at the Tri-Beta Regional conventions
- 2015 Referee at the Western Colorado Science Fair
- Multiple SOAR/Freshman Orientation, Mav Scholars, and Major and Graduate Fair sessions

Advising:

Currently advising 34 students.

Honors and Awards:

CMU- Exemplary Faculty award 2013

Megan Wilson Sherbenou, Ph.D.

Assistant Professor

Home Address: 63555 Spring Creek Rd., Montrose, CO 81403

(303) 912-9292 * megansherbenou@gmail.com

EDUCATION:

2008-2011 Post Doctoral Training, Department of Emergency Medicine, Anschutz Medical Campus, University of Colorado

Projects studying the physiology (brain, hemodynamics, respiration, muscle activity, exercise capacity), pathology, genomics, gene and protein expression in humans at high altitude

August 2008 Doctor of Philosophy, Health and Behavioral Sciences

University of Colorado Denver and Health Sciences

Dissertation on the physiological adaptations in human pregnancy linked to genomic signatures of natural selection at high altitude

Over 30 credit hours in graduate-level biology and physiology courses

May 2005 Master of Arts, Biological Anthropology

University of Colorado Denver and Health Sciences

Thesis on physiological factors in oxygen delivery in pregnant women at high altitude

May 2000 Bachelor of Arts, Major Molecular, Cellular, and Developmental Biology

Minor Biochemistry

University of Colorado at Boulder

TEACHING EXPERIENCE:

2016-present Assistant Professor, Department of Biology and Earth Sciences, Adams State University. Courses taught: Biology 205/6- Human Anatomy and Physiology with lab (year-long sequence), Biology 112- Human Anatomy with lab, Biology 125- Nutrition, Biology 209- General Biology I

2012-2016 Lecturer in Biology, Department of Natural and Environmental Sciences, Western State Colorado University. Courses taught (instructor of record and course designer): Biology 120- Public Health, Biology 130/135- Environmental Biology, Biology 150- Biological Principles (molecular), Biology 300- Basic Nutrition, Biology 310- Cell Biology, Biology 372/373- Human Anatomy and Physiology (year-long sequence), Biology 495- High Altitude Biology, Biology 495- Human Reproduction, Biology 497- Immunology, Biology 495- Human Evolution, and EDUC 510- Concurrent Enrollment of Environmental Biology Course.

2011-2012 Research instructor for post-baccalaureate and School of Medicine research students, Altitude Research Center, Department of Emergency Medicine, University of Colorado- Anschutz Medical Campus.

2007 Instructor of record and course designer for Health and Behavioral Sciences 3010- Evolution of Human Sexuality at University of Colorado Denver and Health Sciences.

2006 Instructor of record and course designer for Health and Behavioral Sciences 3031- Health and Human Biology at University of Colorado Denver and Health Sciences.

2003-2004 Lab Manager and Teaching Coordinator for the Anthropology Department at CU-Denver.

2001-2003 Teacher of record of Anthropology 1303 Lab-Introduction to Biological Anthropology at CU-Denver.

PROFESSIONAL RESEARCH EXPERIENCE:

2017 Project examining markers of stress in different student populations (brain electrical activity, hematological markers, immunoglobulins, cardiovascular indicators) to common educational situations. Project used as both a CURE and undergraduate research project. Submitted for funding, IRB

2015- present Project analyzing link between chronic mountain sickness and cytokine indicators of inflammation and oxidative stress

2015-2016 Project exploring epidemiology of activity during pregnancy at high altitude

2014-2016 Principal investigator and mentor of original research for BIOL 497: Immunity in High Moderate Altitude Residents and Athletes

2014-2016 Principal investigator and mentor of original student research for BIOL 135: Effective Trail Restoration Methods in Sage Brush Habitats

2011-2012 Research instructor in the Department of Emergency Medicine, University of Colorado- Anschutz Medical Campus

2011-2012 Co-Investigator on DOD-funded study entitled “AltitudeOmics: The basic biology of human acclimatization to high altitude.” This was a major longitudinal field study conducted in Bolivia on the physiological and genetic acclimatization to hypoxia.

2010-2012 Co-Investigator on DOD-funded study entitled “Prediction of acute mountain sickness using a blood-based test.” This was a longitudinal field study taking place in Dallas, Texas and Breckenridge, Colorado correlating genetic and proteomic markers to neurological and physiological effects of short-term hypoxia.

2008-2011 Postdoctoral fellow in the Altitude Research Center, Department of Emergency Medicine, University of Colorado- Anschutz Medical Campus

2006-2008 Study coordinator National Institutes of Health RO1 HL079647 “Genetic Regulation of Hypoxia-Induced IUGR”

2005 Collected qualitative and quantitative data for the project “Taking Neighborhood Health to Heart” (community-based participatory research on the built environment and its effects on cardiovascular health)

2001-2008 Graduate researcher in the lab of Dr. Lorna G. Moore, Cardiovascular Pulmonary division of University of Colorado Health Science Center studying pregnancy at high altitude in Colorado and Bolivia

1998-1999 Student researcher in lab of Dr. Brad Olwin, Department of Molecular, Cellular, and Developmental Biology, CU-Boulder. I studied the role of FGFR-8 in chick limb development as a possible mechanism of achondroplastic dwarfism

1997 Research assistant in the Summer Undergraduate Research Experience at CU-Boulder.

SERVICE:

2017 (ongoing) Member of Health Professions Advisory Committee

2017 (ongoing) Currently serve on two M.S. Thesis Committees: Students Green and Jacobs

2017 Curriculum rework of Nutrition, with submissions to the Curriculum Review Committee and paperwork for General Education and Colorado Guaranteed Transfer Pathways

2016-2017 Member of the AAA Review Committee: Committee reworking philosophy, structure, and curriculum of the first-year experience seminar for freshmen (currently titled "Academic Achievement Strategies")

2008-present Active participant and contributor to biology program assessments

Peer reviewer for *Heredity*.

Peer reviewer for *Economics and Human Biology*.

Peer reviewer for *High Altitude Medicine and Biology*.

Judge at Creative Activities and Research Symposium.

Judge at San Luis Valley Regional Science Fair.

TRAINING:

2018 Project to assist in development of the Online Equity Institute as a trial trainee

2017 Teaching workshop Human Anatomy and Physiology Society International Meeting

2017 Unidos Equity Leadership Institute training to become a leader in higher education equity work

2017 Co-HPD Pre-Health and Faculty Advisors Workshop with the Colorado Health Professions Development Program under the Colorado Area Health Education Center Program

2017 Appreciative Advising Workshop

2016 Howard Hughes Medical Institute and the National Academies Summer Institute on Undergraduate Education Update Workshop

2016 Co-HPD Pre-Health and Faculty Advisors Workshop with the Colorado Health Professions Development Program under the Colorado Area Health Education Center Program

2015-2016 National Academies Education Fellow in the Life Sciences through the Howard Hughes Medical Institute and the National Academies Summer Institute on Undergraduate Education

2014-2016 Collaborative Institutional Training Initiative, Certification in Human Subjects Protections as a Principal Investigator and Supervisor

2011-2012 Colorado Mentoring Training Program to maximize the mentoring relationship with one of my mentees.

2011 American Physiological Society Professional Skills Training Course: Writing and Reviewing for Scientific Journals

2011 Professional Grant Development Workshop

2008 Genomics & Proteomics Hands-On Workshop, University of Colorado and National Jewish Health

AWARDS AND GRANTS:

2017 Competitive selection for stipend award to attend Unidos Equity Leadership Institute

2015-2016 National Academies Education Fellow in the Life Sciences

2010-2012 Co-Investigator on DOD-funded study entitled "AltitudeOmics: The basic biology of human acclimatization to high altitude." This was a major longitudinal field study conducted in Bolivia. Award amount: \$1.9 million

2010-2012 Co-Investigator on DOD-funded study entitled "Prediction of acute mountain sickness using a blood-based test." This was a longitudinal field study taking place in Dallas, Texas and Breckenridge, Colorado. Award amount: \$1.8 million

2007 Outstanding Graduate Student Presentation at the International Hypoxia Symposium for oral presentation and poster entitled "Finding gene candidates for natural selection in high-altitude pregnancy." Award amount: \$500

2007 Outstanding Research Award at the University of Colorado's Research and Creative Activities Symposium. Award amount: \$200

2003-2006 National Science Foundation Graduate Research Fellowship, Three year fellowship with stipend and educational expenses. Award amount: about \$125,000

2006-2008 Study Coordinator National Institutes of Health RO1 HL079647; Principal investigator Dr. Lorna G. Moore

2002 E.E. Hunt Student Prize Award at the conference of the Human Biology Association for poster entitled "Uterine artery blood flow and blood flow redistribution during pregnancy in Andean high-altitude women." Award amount: \$300

1999 Cancer Research Fellowship- Howard Hughes Initiative

1998 Undergraduate Research Opportunities Program grant- CU-Boulder

1997 Undergraduate Research Assistanceship Program grant- CU-Boulder

PAPERS:

Moore LG, **Wilson MJ**, Vargas M, Niermeyer S, Armaza FJ, Vargas E. Physiological determinants of reproductive success: a paradigm for understanding the ways in which genes influence adaptation to high altitudes. *Proceedings of the 5th World Congress on Mountain Medicine and High Altitude Physiology*. (G Vicor, A Ricart, C Leal, ed), Barcelona, SP: UnivBarcelona Press, pp 205-214, 2003.

Julian CG, Vargas E, Armaza JF, **Wilson MJ**, Niermeyer S, Moore LG. High-altitude ancestry protects against hypoxia-associated reductions in fetal growth. *Arch Dis Child Fetal Neonatal Ed*. 2007;92(5):F372-7.

Moore LG, Shriver M, Bemis L, Hickler B, **Wilson MJ**, Brutsaert T, Parra E, and Vargas E. Maternal adaptation to high-altitude pregnancy: an experiment of nature--a review. *Placenta 25 Suppl A*. 2007;S60-71.

- Vargas M, Vargas E, Julian CG, Armaza JF, Rodriguez A, Tellez W, Niermeyer S, **Wilson MJ**, Parra E, Shriver M, Moore LG. Determinants of blood oxygenation during pregnancy in Andean and European residents of high altitude. *Am J Physiol Regul Integr Comp Physiol*. 2007;293(3):R1303-12.
- Wilson MJ**, Lopez M, Vargas M, Julian CG, Tellez W, Rodriguez A, Bigham A, Armaza JF, Niermeyer S, Shriver M, Vargas E, Moore LG. Greater uterine artery blood flow during high-altitude pregnancy in indigenous (Andean) than Foreign (European) women. *Am J Physiol Regul Integr Comp Physiol*. 2007;293(3):R1313-24.
- Julian CG, Galan HL, **Wilson MJ**, Desilva W, Cioffi-Ragan D, Schwartz J, Moore LG. Lower uterine artery blood flow and higher endothelin relative to nitric oxide metabolite levels are associated with reductions in birth weight at high altitude. *Am J Physiol Regul Integr Comp Physiol*. 2008;295(3):R906-15.
- Julian CG, **Wilson MJ**, Lopez M, Yamashiro H, Tellez W, Rodriguez A, Bigham AW, Shriver MD, Rodriguez C, Vargas E, Moore LG. Augmented uterine artery blood flow and oxygen delivery protect Andeans from altitude-associated reductions in fetal growth. *Am J Physiol Regul Integr Comp Physiol*. 2009;296(5):R1564-75.
- Julian CG, **Wilson MJ**, Moore LG. Evolutionary adaptation to high altitude: a view from in utero. *Am J Hum Biol*. Epub 2009 Apr 14. PubMed PMID: 19367578.
- Bigham AW, Mao X, Mei R, Brutsaert T, **Wilson MJ**, Julian CG, Parra EJ, Akey JM, Moore LG, Shriver MD. Identifying positive selection candidate loci for high-altitude adaptation in Andean populations. *Human Genomics*. 2009 Dec; 4(2): 79-90.
- Davila RD, Julian CG, **Wilson MJ**, Browne VA, Rodriguez C, Bigham AW, Shriver MD, Vargas E, Moore LG. Do anti-angiogenic or angiogenic factors contribute to the protection of birth weight at high altitude afforded by Andean ancestry? *Reprod Sci*. 2010 Sep;17(9):861-70.
- Davila RD, Julian CG, **Wilson MJ**, Browne VA, Rodriguez C, Bigham AW, Shriver MD, Vargas E, Moore LG. Do cytokines contribute to the Andean-associated protection from reduced fetal growth at high altitude? *Reprod Sci*. 2011 Jan;18(1):78-87.
- Bigham A, Bauchet M, Pinto D, Mao X, Akey JM, Mei R, Scherer SW, Julian CG, **Wilson MJ**, Herraez DL, Brutsaert T, Parra EJ, Moore LG, Shriver MD. Identifying signatures of natural selection in Tibetan and Andean populations using dense genome scan data. *PLOS Genet*. 2010 Sep;6(9): e1001116.
- Browne V, Toledo-Jaldin L, Davila RD, Lopez L, Yamashiro H, Cioffi-Ragan D, Julian CG, **Wilson MJ**, Bigham A, Shriver M, Honigman B, Vargas E, Roach R, Moore L. High end-arteriolar resistance limits uterine artery blood flow and restricts fetal growth in preeclampsia and gestational hypertension at high altitude. *Am J Physiol Regul Integr Comp Physiol*. 2011 Feb 16.
- Subudhi AW, Dimmen AC, Julian CG, **Wilson MJ**, Paneri RB, Roach RC. Effects of acetazolamide and dexamethasone on cerebral hemodynamics in hypoxia. *J Appl Physiol*. 2011 Mar 10.
- Wilson MJ**, Julian CG, Roach RC. Genomic analysis of high altitude adaptation: Innovations and implications. *Current Sports Medicine Reports*. 2011 Mar/Ap;10(2):59-61.
- Julian CG, Hageman JL, **Wilson MJ**, Vargas E, Moore LG. Lowland origin women raised at high altitude are not protected against lower uteroplacental O₂ delivery during pregnancy or reduced birth weight. *Am J Hum Biol*. 2011 Jul-Aug;23(4):509-16.

Julian CG, Subudhi AW, **Wilson MJ**, Dimmen AC, Pecha T, Roach RC. Acute mountain sickness, inflammation, and permeability: new insights from a blood biomarker study. *J Appl Physiol*. 2011 Aug; 111(2):392-9.

Julian CG, Vargas E, Browne VA, **Wilson MJ**, Bigham AW, Rodriguez C, McCord JM, Moore LG. Potential role for elevated maternal enzymatic antioxidant status in Andean protection against altitude-associated SGA. *J Matern Fetal Neonatal Med*. 2011 Nov 30.

Dávila RD, Julian CG, Browne VA, Toledo-Jaldin L, **Wilson MJ**, Rodriguez A, Vargas E, Moore LG. Role of cytokines in altitude-associated preeclampsia. *Pregnancy Hypertens*. 2012 Jan;2(1):65-70.

20. Bigham AW, **Wilson MJ**, Julian CG, Kiyamu M, Vargas E, Leon-Velarde F, Rivera-Chira M, Rodriguez C, Browne VA, Parra E, Brutsaert TD, Moore LG, Shriver MD. Andean and Tibetan patterns of adaptation to high altitude. *Am J Hum Biol*. 2013 Mar-Apr;25(2):190-7.

21. Schwartz J, Cioffi-Ragan D, **Wilson MJ**, Julian CG, Beatty B, Moore LG, Galan HL. Little effect of gestation at 3,100 m on fetal fat accretion or the fetal circulation. *Am J Hum Biol*. 2013 Jul-Aug;25(4):544-9.

22. Julian CG, Subudhi AW, Hill RC, **Wilson MJ**, Dimmen AC, Hansen KC, Roach RC. Exploratory proteomic analysis of hypobaric hypoxia and acute mountain sickness in humans. *J Appl Physiol*. 2014 Apr 1;116(7):937-44.

23. Bigham AW, Julian CG, **Wilson MJ**, Vargas E, Browne VA, Shriver MD, Moore LG. Maternal PRKAA1 and EDNRA genotypes are associated with birth weight, and PRKAA1 with uterine artery diameter and metabolic homeostasis at high altitude. *Physiol Genomics*. 2014 Sep 15;46(18):687-97.

SCHOLARSHIP IN TEACHING AND LEARNING:

Roth-Johnson EA, Hays S, **Sherbenou M**, Steele JW, Cruz T, O'Halloran T, De Lozanne A. Data-driven discovery of second messengers: A model for introducing the process of science into non-laboratory courses. American Society for Cell Biology (2015). 2015 ASCB/IFCB Meeting abstracts. *Mol Biol Cell* 26:4523.

S. **Sherbenou MJ**. Muscular system case study: Maria's marathon. Submitted to National Center for Case Study Teaching in Science. Awaiting peer review.

INVITED PRESENTATIONS:

Living High: Modern Human Evolution at High Altitude. April 2017, Key note speaker for the state-wide Colorado Tri Beta Society (undergraduate biology honor's Society) meeting.

High altitude, natural selection, and pregnancy. April 2012, invited speaker for plenary session at the annual meeting of the Human Biology Association- Portland, Oregon.

Career Opportunities: Exploring your options in science. October 2010. Invited talk for the undergraduate students of the basic science program at the University of Colorado Denver, Auraria Campus.

Genetics of High Altitude Illness and a "Meet the Experts" Panel. February 2010. Invited talk for American College of Sports Medicine, Rocky Mountains. The panel talk was geared towards making the science accessible to students and/or the lay audience.

Application of Evolutionary Theory to Modern Human Research. September 2008. Presentation to HBSC 7031 Human Ecology and Environmental Adaptation. University of Colorado Denver- Auraria campus.

Application of Evolutionary Theory to High Altitude Research. October 2007. Presentation t HBSC 7031 Human Ecology and Environmental Adaptation. University of Colorado Denver- Auraria campus.

How Can We Research Evolution of Human Reproduction? September 2007. HBSC 3010 Evolution of Human Sexuality. University of Colorado Denver- Auraria campus.

Finding gene candidates for natural selection in high-altitude pregnancy. February 2007. International Hypoxia Symposium- Banff, Alberta, Canada.

POSTERS PRESENTED AS FIRST AUTHOR:

- 2011 International Hypoxia Symposium
“Genetic signatures of acute mountain sickness”
- 2009 American Association of Physical Anthropology
“Natural selection for birth weight at high altitude”
- 2007 International Hypoxia Symposia
“Finding gene candidates for natural selection in high-altitude pregnancy”
“Higher uterine artery blood flow during high-altitude pregnancy in indigenous (Andean) than foreign (European) women”
- 2004 UCD Research and Creative Activities Day
“Low uterine artery (UA) blood flow precedes the onset of altitude-associated fetal growth restriction”
“Lower uterine artery blood flow and higher Et-1:NOx levels reduce birth weight at high altitude”
“Uterine artery blood flow in high altitude Aymara women”
- 2003 International Hypoxia Symposium “Uterine artery blood flow in high altitude Aymara women”
- 2002 Human Biology Association poster entitled “Uterine artery blood flow and blood flow redistribution during pregnancy in Andean high-altitude women.”

CERTIFICATIONS:

American College of Sports Medicine, Physical Activity in Public Health Specialist

Collaborative Institutional Training Initiative, Certification in Human Subjects Protections as a Principal Investigator

REFERENCES:

Cassandra Osborne, PhD (Past teaching supervisor, Head of Biology)
Professor of Biology, Discipline Coordinator of Biology
Western State Colorado University
600 North Adams Street
Gunnison, Colorado 81231
Phone: (970) 943-3181
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Lorna G. Moore, PhD (Dissertation Thesis Advisor)
Professor, Department of Obstetrics & Gynecology
Division of Basic Reproductive Sciences
University of Colorado, Anschutz Medical Center
Mail Stop 8613
Aurora, Colorado 80045
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Peter Gauss, PhD (Previous discipline coordinator and supervisor)
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Assistant Professor, Department of Medicine
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University of Colorado, Anschutz Medical Center
Mail Stop 8611
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David Tracer, PhD (PhD Dissertation Committee Member)
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Campus Box 188, PO Box 173364
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Kristy Duran, PhD (Teaching Colleague, Faculty Evaluation Committee Member)
Associate Professor of Biology, Department of Biology and Earth Sciences
Adams State University
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Alamosa, CO 81101
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klduran@adams.edu

Matthew S. Stansbury, Ph.D.
Department of Biological Sciences
Colorado Mesa University
Grand Junction, Colorado

Education:

NIH-PERT Postdoctoral Fellow, Center for Insect Science, University of Arizona, 2011-2014
Ph.D., Ecology, Evolution & Behavior, Indiana University Bloomington, 2011
B.S., University of Nebraska Omaha, 2004

Teaching:

CMU:

BIOL 101L General Human Biology Laboratory (1cr)
BIOL 105 Attributes of Living Systems (3cr)
BIOL 105L Attributes of Living Systems Laboratory (1cr)
BIOL 301 Principles of Genetics (3cr)
BIOL 301L Principles of Genetics Laboratory (1cr)
BIOL 310 Developmental Biology (3cr)
BIOL 310L Developmental Biology Laboratory (2cr)
BIOL 387 Structured Research (variable credits)
BIOL 403 Evolution (3cr)
BIOL 496 Topics - Evolutionary Developmental Biology (3cr)
Pima Community College (Tucson, AZ):
BIO 182 General Biology II (lecture and lab combined) (4cr)

Evidence of Continuous Improvement

Dr. Linda Nilson, Critical Thinking Unmasked workshop -- Fall 2016
Professionalism, Constructive Criticism, and Dealing with Volatile Students program -- Spring 2015
Teacher2Teacher Maverick Milestone event -- Spring 2015

Innovative Materials/Activities

Designed and implemented several new labs for BIOL 301L - Blast and MEGA software for bioinformatics analysis/ molecular phylogenetics, genetics ethics debates
Overhauled intro BIOL 101L lab - humans in context of tree of life, interactive phylogenetics exercise

Supervision of Student Research/Project(s)

Current students:

Alena Pinel, continuing her investigation into the function of the *doublesex* gene in firefly lantern sexual dimorphism. Kaitlin Webb, analyzing differential transcript expression dataset to identify and clone gene candidates suspected to play roles in firefly lantern development.
Shannon Heimann, analyzing differential transcript expression dataset to identify and clone gene candidates suspected to play roles in firefly lantern development.

Past students:

Miranda DePriest, supervised 3 semesters for Structured Research credits (Spring 2015, Fall 2015, Spring 2016), and 10-week Summer SIPBR internship (see presentations below). Research project focused on investigating functional divergence among luciferase paralogs in firefly genomes.

Briana Gomez, supervised 1 semester for Structured Research credit (Fall 2015). Research project focused on amplification and cloning of two Hox genes in *Photuris* fireflies.

Alena Pinel, supervised 1 semester for Structured Research credit (Spring 2016) and 10-week Summer SIPBR internship (see presentation below). Research project focused on investigating the function of the *doublesex* gene in firefly lantern sexual dimorphism.

Supervised CMU Student Presentations:

Alena Pinel, *The Effects of Double-Sex on the Sexual Dimorphism of the Photic Organ of Photuris*, Saccomanno Internship Program in Biological Research Symposium -- Summer 2016

Miranda DePriest, *Functional Divergence of luciferase Paralogs in Photuris pennsylvanica*, Student Showcase -- Spring 2016

Miranda DePriest, *Functional Divergence of luciferase Paralogs in Photuris pennsylvanica*, Saccomanno Internship Program in Biological Research Symposium -- Summer 2015

Scholarship and Creative Work:

Journal Articles

Stansbury MS and Moczek AP. (2014) The function of Hox and appendage-patterning genes in the development of an evolutionary novelty, the *Photuris* firefly lantern. *Proceedings of the Royal Society B: Biological Sciences*. 281(1782).

Markopoulou K, Dickson DW, McComb RD, Wszolek ZK, Katechalidou L, Avery L, Stansbury MS, and Chase BA. (2008) Clinical, neuropathological and genotypic variability in *SNCA* A53T familial Parkinson's disease. *Acta Neuropathologica*. 116(1): 25-35.

Conference Presentation

European Society for Evolutionary Developmental Biology. *The firefly lantern: Transcriptome sequencing and developmental genetics of an evolutionary novelty*. Lisbon, Portugal – 7/2012.

Center for Insect Science – Hexapodium. *The firefly lantern: Developmental genetics of an evolutionary novelty*. Tucson, Arizona – 3/2012.

Society for the Study of Evolution. *The firefly lantern: Developmental genetics of an evolutionary novelty*. Portland, Oregon – 6/2010.

IGERT Symposium. *Developmental genetics of the firefly lantern*. Bloomington, Indiana – 11/2009.

Society for Molecular Biology and Evolution. *Developmental genetics of the firefly lantern*. Iowa City, Iowa – 6/2009.

Society for the Study of Evolution. *The firefly lantern: Developmental genetics of an evolutionary novelty*. Minneapolis, Minnesota – 6/2008.

Book Chapters

Stansbury MS and Moczek AP. (2013) The evolvability of arthropods. In: Minelli A, Boxshall G, Fusco G (eds) *Arthropod biology and evolution: molecules, development, morphology*. Springer-Verlag, Berlin Heidelberg.

Other

Attended workshop at UC-Davis to learn Galaxy software platform for bioinformatics - now training research students to use

Service:University

Graduate Advisory Committee (newly appointed as of 8/2016) Scholarship Committee -- 3/2016-present

Department

Research talk for Biology Club -- Spring 2016

Hiring Committee (resulting in hiring of Dr. Theresa McHugh for tenure-track faculty position) --
12/2015-3/2016 "Night at the Laboratory" fundraiser participant -- 11/2015

Hiring Committee (resulting in hiring of Dr. Zeynep Ozsoy for tenure-track faculty position) -- 12/2014-
3/2015

LocalCMU:

Speaker, "Is Cyclops Real?: Mysteries in Developmental Biology," Society of Physics Students Annual
Egg Drop Event (Elementary/Middle school students) -- Spring 2016

Speaker/Activity Leader, "Walking the Line: Experiments in Insect Communication," Junior Scientist
Academy -- Spring 2016

Speaker, "Predator-Prey Arms Race," Society of Physics Students Annual Egg Drop Event
(Elementary/Middle school students) -- Spring, 2015

University of Arizona:

Science fair judge, Flowing Wells High School – Spring 2014.

Invited lecturer, "Phylogenetics," Pima Community College – Summer 2013. Presenter/Booth organizer,
"Luminous Insects," Arizona Insect Festival – Fall 2012. Invited speaker, "Predator-prey arms race,"
Basis Middle School – 2 sessions, Spring 2012.

Co-wrote/co-produced grand prize award-winning anti-bullying PSA, "I Will," Fund for Civility,
Respect and Understanding – Spring 2012.

Indiana University:

Guest Instructor, "Harmful and Beneficial Insects," Bloomington Developmental Learning Center – Fall
2010. Research Mentor for minority high school students, Lilly Scholars Program – One week,
Summer 2010.

Instructor, "Entomology," Big Brothers Big Sisters of South Central Indiana – 3 sessions, Spring 2010.

Invited Speaker, "Insects and Evolution," Templeton Elementary School – Fall 2009.

Research Mentor for high school students, Lilly Scholars Program – One week, Summer 2009. Nature
Guide/Instructor, Templeton Elementary School – Spring 2007.

Invited Speaker, "What is science?" Templeton Elementary School – Fall 2006.

UNOmaha:

Instructor, Academy of Excellence Program, UNLincoln – Summer 2004.

Advising:University level

Mesa Experience recruitment session – Multiple sessions

Freshman Orientation Session – Multiple sessions

Faculty Training for Student Orientation -- Spring 2015

Department level

50 student advisees

Panelist at BioBlub/ChemClub graduate school panel -- Spring, 2016

SIPBR graduate school panel -- Summer 2015

Professional Experience:

Assistant Professor of Biology, Colorado Mesa University, 2014-present

Leslie Myers, "Brainy But Balanced: Achieving the Elusive Work-Life Balance in Academia" workshop
-- Spring 2015

Campus In Service Safety training (3 sessions) -- Spring 2015

Curriculum vitae

Stephen Robert Stern, Ph.D.

Associate Professor, Colorado Mesa University

Department of Biological Sciences,
Colorado Mesa University
1260 Kennedy Ave,
Grand Junction, CO 81501 USA

Ph: +01 970 248 1674
email: sstern@coloradomesa.edu

Education and Experience:

2016-present: Associate Professor, Colorado Mesa University, Grand Junction Colorado.

2011- 2016: Assistant Professor, Colorado Mesa University, Grand Junction, Colorado.

I am an active member in the department of Biological Sciences and have participated on five faculty search committees, serve as the Biology Honors Program advisor, and been a member of numerous departmental committees. Campus-wide I have been chair of the faculty salary and benefits committee, a member of the Tenure and Promotion Committee, and a member of the Mission Criterion Committee for HLC accreditation. I have received Exemplary Faculty awards in 2012, 2013, 2014, and 2015 and was nominated in 2016. I was nominated for the Distinguished Faculty award in 2017.

2011: Ph.D., Department of Biology, University of Utah.

Dissertation title: Systematics of *Solanum* section *Micracantha*. Winner of the Riser Award for Outstanding Research in the Biology Department.

Dissertation Committee: Lynn Bohs (Chair), Dale Clayton, Lissy Coley, Dinah Davidson, Leigh Johnson, and John Sperry.

2004: B.S. in Biology, *Summa Cum Laude*, The University of North Carolina at Asheville. I received the Bernhardt-Perry Award for Excellence in Undergraduate Research in Biology, Distinction as a University Research Scholar, and Departmental Distinction in Biology.

Undergraduate thesis title: Biogeographical Investigation Using Florulas for Seven Sites in Northern South America.

Undergraduate advisor: David Clarke

2001: Graduated second in class from The Asheville School with awards in Biology, English, and Mathematics.

Teaching Experience:

Colorado Mesa University

Professor of **General Human Biology** lecture and lab (Biol 101 & 101L), **Principles of Plant Biology** lecture and lab (Biol 107 & 107L), **Diversity of Organisms** lecture (Biol 108), **Plant**

Systematics lecture (Biol 320), **Taxonomy of Grasses** lecture and lab (Biol 321 & 321L), **Plant Identification** lecture and lab (Biol 322 & 322L), **Topics in Biology** (Biol 396), guest lecturer on **Tropical Field Biology** (Biol 407), **Senior Thesis** lecture (Biol 483) and various **research and internship classes** (Biol 387, Biol 487, Biol 493, Biol 495, and Biol 499).

University of Utah

Teaching Assistant **Molecular Biology of DNA** (lead instructor for laboratory), **Field Botany** (co-lead instructor for laboratory), **Plant Systematics** (co-lead instructor for laboratory), **Form, Function, and Adaptation of Plants** (co-lead instructor for laboratory), **Evolution and Diversity of Life** (lead instructor for discussion section).

Developmental Biology (co-lead instructor for laboratory, lead for discussion section).

Research Interests

My primary interest lies in understanding the biodiversity and the evolution of vascular plants through both taxonomic and phylogenetic approaches. I have investigated these questions on a species level in my monograph of *Solanum* section *Micracantha*, at the genus level in molecular phylogenetic studies across the genus *Solanum*, and at a community level using floras from various sites across northern South America. I am also conducting floristic studies in Colorado, particularly an inventory of the plants of McInnis Canyon National Conservation Area.

Publications (asterisks indicate international, peer-reviewed journals):

***S. Stern** & L. Bohs. 2016. An eight marker phylogenetic analysis of *Solanum* section *Micracantha*. *Systematic Botany* 41(1): 120-127.

S. Stern. 2016. Ecosystem change along the Old Spanish Trail over the past 200 years. *Spanish Traces* 22:2.

S. Stern. 2016. Book review for “Quiver Trees, Phantom Orchids, and Rock Splitters: The remarkable Survival Strategies of Plants” for *Plant Science Bulletin* 62: 176-178.

***S. Stern**. 2014. A new species of spiny *Solanum* (Solanaceae) from Peru. *Phytokeys* 39:27-34.

S. Stern. 2014. Book Review for “Colorado Rocky Mountain Wildflowers. App for Apple and Android.” *Plant Science Bulletin* 60: 108-109.

***S. Stern**, L. Bohs, & J. Keeling. 2014. New species and combinations in *Solanum* section *Androceras* (Solanaceae). *Botanical Research Institute of Texas* 8: 1-7.

S. Stern et al. 2013. Solanaceae Treatment in *Flora de Argentina: Flora Vasculare de la República Argentina* Vol. 13.

***S. Stern**, L. Bohs, L. Giacomini, J. Stehmann, & S. Knapp. 2013. A revision of *Solanum* section *Gonatotrichum* (Solanaceae). *Systematic Botany*. 38: 471-496.

*M. Vorontsova, **S. Stern**, L. Bohs, and S. Knapp. 2013 African Spiny *Solanum* (subgenus *Leptostemonum*, Solanaceae): A thorny phylogenetic tangle. *Botanical Journal of the Linnean Society*. 1: 1-18.

S. Stern. 2012. Solanaeae Treatment *in* The Flora of Oregon. available online at <http://www.oregonflora.org/flora.php>

***S. Stern** & L. Bohs. 2012. An explosive innovation: Phylogenetic relationships of *Solanum* section *Gonatotrichum* (Solanaceae) *Phytokeys* 8:83-98. doi:10.3897/phytokeys.8.2199.

***S. Stern**, M.F. Agra, and L. Bohs. 2011. Molecular Delimitation in *Solanum* subgenus *Leptostemonum*. *Taxon*. 60: 1429-1441.

***S. Stern**, T. Weese, and L. Bohs. 2010. A three-gene evolutionary study of *Solanum* section *Androceras*. *Systematic Botany*. 4: 885-893.

***S. Stern** and L. Bohs. 2010. Two new species of *Solanum* (Solanaceae) from the Amotape-Huancabamba Zone of southern Ecuador and northern Peru. *Phytokeys* 1:33-65 doi:10.3897/phytokeys.1.660.

***S. Stern** and L. Bohs. 2009. Two new species of *Solanum* from Ecuador and new combinations in *Solanum* section *Pachyphylla* (Solanaceae). *Journal of the Botanical Research Institute of Texas* 3(2): 503-510.

***S. Stern**, E. Tepe and L. Bohs. 2008. Checklist of *Solanum* of north-central Peru, a hotspot of biological diversity. *Arnoldia* 15:277-284.

L. Bohs, T. Weese, N. Myers, V. Lefgren, A. Van Wagenen, N. Thomas, and **S. Stern**. 2007. Zygomorphy and heterandry in *Solanum* in a phylogenetic context. *In* L. Bohs, J. Giovannoni, R. Olmstead, D. Shibata, and D. Spooner [eds.] *Solanaceae VI: Genomics Meets Biodiversity*. *Acta Hort.* 745: 201-223.

S. Stern. 2005. Biogeographical Investigation Using Florulas for Seven Sites in Northern South America. *UNCA Journal of Undergraduate Research*.

Manuscripts in preparation:

S. Stern & L. Bohs. A taxonomic revision of *Solanum* section *Micracantha*. For submission in *Systematic Botany Monographs*.

S. Stern & T. Middleton. Piecing together the phylogenetic puzzle: new molecular markers help resolve the phylogeny of *Solanum* sect. *Androceras*. For submission in *Phytokeys*.

Awards:

August 2017: Co-PI on National Science Foundation ADBC award: ~\$14,000

August 2013 & August 2015: BLM research grants: three subgrants totaling \$67,425

August 2012: CMU faculty development grant: \$1822

May 2012: DEAR research grant: \$1900

May 2011: The Riser Award for Outstanding Research in the Dept. of Biology: \$750

August 2010: A. Herbert Gold and Marian W. Gold Scholarship: \$5000 (2 years)

July 2009: American Society of Plant Taxonomists travel grant: \$300

May 2009: University of Utah Graduate School travel grant: \$800

May 2007: ASUU summer travel grant: \$500

May 2006: Seville Flowers Botany Award, University of Utah: \$250

Summer 2004: Joan and Rachel Hunt Summer Scholarship in Field Botany from The Garden Club of America: \$1500

Summer 2004: Summer research grant from UNCA's Department of Undergraduate Research: \$2000

Summer 2003: Joan and Rachel Hunt Summer Scholarship in Field Botany from The Garden Club of America: \$1500

Summer 2003: Summer research grant from UNCA's Department of Undergraduate Research: \$2000

Presentations & Posters:

S. Stern. "Dominant plants and habitats of western Colorado" Invited Speaker for Colorado Native Plant Society Annual Meeting, Grand Junction, Sep 28, 2019.

S. Stern. "Systematics of *Solanum*: Incorporating Undergraduates in the Lab and Herbarium. Botany 2014 (American Society of Plant Taxonomists), July 26-30 Boise.

S. Stern & Ellen Garcia. "Sequencing the Secrets of *Solanum*" Botany 2013 (American Society of Plant Taxonomists), July 27-31, 2013 New Orleans.

S. Stern & Marcus Hooker. "Genetics of two *Astragalus* species endemic to Colorado and Utah" Botany 2013 (American Society of Plant Taxonomists), July 27-31, 2013 New Orleans.

S. Stern "Prickly Phylogenies: An overview of the spiny solanums. International Botanical Congress 2011, July 23-30 2011 Melbourne, Australia.

S. Stern "A thorny tangle in the genus *Solanum*: Phylogenetic study of *Solanum* subgenus *Leptostemonum*," Botany 2010 (American Society of Plant Taxonomists), July 31- Aug. 1, 2010 Providence, Rhode Island.

S. Stern "A spiny situation in the genus *Solanum*: Delimiting sections in subgenus *Leptostemonum*," Botany 2009 (American Society of Plant Taxonomists), July 25-29, 2009 Snowbird, Utah.

S. Stern "Systematics of *Solanum* section *Androceras*," Evolution Meeting (Society for Systematic Biology), June 13-16, 2009 Moscow, Idaho.

S. Stern "Systematics of *Solanum* section *Gonatotrichum*" Evolution Meeting (Society for Systematic Biology), July 20-24, 2008 Minneapolis, Minnesota.

J.C. Granados, L. Bohs, N. Myers, and **S. Stern** "Trees for Troublesome Taxa: A molecular phylogeny of *Solanum* section *Geminata*" 6th International Solanaceae Conference, July 23-27, 2006 Madison, Wisconsin.

Field Experience:

2012-present: Plant Identification field courses throughout western CO.

May-June, 2012: Guest lecturer and collection for CMU field course in Ecuador.

July 2011: Plant collecting in Queensland, Australia.

May-July 2010: Visits to major herbaria in Paris, London, Geneva, Brussels, Munich, and Vienna.

January-February 2009: Ecuador. Plant collecting in Manabí, Pichincha, Los Rios, and Napo provinces and herbarium visits to QCNE and QCA in Quito.

December 2008: Plant collecting in Guyana and Trinidad and Tobago.

August 2008: Brazil. Plant collecting in northeastern state of Paraíba and herbarium visit to JPB in João Pessoa, Paraíba.

November 2007- December 2007: Peru. Plant collecting in Ancash, Amazonas, Cajamarca, and San Martin departments, and herbarium visits to USM in Lima and TRUJ in Trujillo.

April 2007- May 2007: Bolivia. Plant collecting in Santa Cruz, Cochabamba, and Beni departments, and herbarium visits to USZ in Santa Cruz and BOLV and COCH in Cochabamba.

June 2006- July 2006: Organization for Tropical Studies Plant Systematics course at field stations and herbaria throughout Costa Rica.

July 2005: Tropical Botany course with Dr. Walter Judd of the University of Florida in collaboration with the Fairchild Tropical Botanical Garden

May 2004- August 2004: Guyana. Plant collecting expedition with Dr. H. David Clarke to Mt. Marigma, near Mt. Roraima on the Brazil border.

May 2003- August 2003: Guyana. Plant collecting expedition with Dr. H. David Clarke to Mt. Wokomung, Pakaraima Mountains.

February 2003- May 2003: Volunteer for the National Forest Service at the Southern Research Station doing fruit and seed analysis as well as organizing their herbarium.

January 2002- May 2002: Volunteer for the North Carolina Arboretum.

Professional and Community Service

Community Service:

Over 25 community outreach events with community organizations including local home, elementary and middle schools, non-profit organizations like Western Colorado Civilian Conservation Corps, Mesa Land Trust, Colorado Canyons Association, and Ariel Clinical Services foster care agency, and state organizations including various Colorado State Parks. Through these events I have taught over 750 people about the natural history of western Colorado.

President of Plateau chapter of the Colorado Native Plant Society (2011-2017). I have led and coordinated over fifteen field trips and workshops to educate the public about native plants.

Chair of Colorado Native Plant Society research grants committee (2014-present).

Board member of Desert Ecosystem Analysis and Restoration (DEAR), a local non-profit dedicated to educating about Colorado's desert and funding restoration (2012-2015).

Professional Service:

Peer-reviewer for the scientific journals *Phytokeys*, *Systematic Botany*, *Resources*, *Phytotaxa*, and the *Botanical Research Institute of Texas*. In total, I have reviewed over 20 articles for these journals

Online mentor for the Botanical Society of America's "Planting Science" program to educate and mentor elementary and middle school students (2011-present).

Member of American Society of Plant Taxonomists and Society for Herbarium Curators grant Committee (both 2014-present).

Professional Memberships

American Society of Plant Taxonomists

Botanical Society of America

Colorado Native Plant Society
International Association of Plant Taxonomists
Society of Systematic Biologists
Association of Southeastern Biologists
Utah Native Plant Society

Student Mentoring (selected CMU Students from the ~25 student researchers mentored):

Ellen Garcia- Ellen conducted research in my lab over four semesters, including a summer Saccomanno Research Fellowship. She presented her research at the 2012 and 2013 CMU Student Showcase and won first prize for her talk at the 2013 Tri-Beta Society Colorado meeting. She presented at the Botany 2013 meeting in New Orleans. She is now a Ph.D. candidate at Virginia Tech.

Marcus Hooker- I informally mentored Marcus Hooker in the lab the summer after he graduated on a phylogenetic research project working with local species in the genus *Astragalus*. Marcus presented this research at the national Botany conference in New Orleans in 2013. He is currently a Ph.D. student at Washington State University.

Evan Cunningham & Adriana Ramos- In 2013, these students took research credits and learned lab skills including DNA extraction, PCR, and DNA sequencing.

Orianna Rubin- Orianna conducted herbarium and field work with me in 2014 for my BLM grant to study the flora of McInnis Canyon National Conservation Area.

Mariah Weinke- Mariah began laboratory research in January 2014 and is conducting phylogenetic research. She was awarded a Saccomanno Research Fellowship in 2014, presented and won best talk in her track at the 2015 CMU Student Showcase. She is currently in dental school in Utah.

Tawni Middleton- Tawni is conducted phylogenetic research in my lab and learned lab skills including DNA extraction, PCR amplification, DNA sequencing, and phylogenetic analysis. She is currently a Ph.D. candidate at UC-Davis.

External References (please feel free to contact any of my references):

Lynn Bohs (Thesis Advisor), Professor of Biology, University of Utah
bohs@biology.utah.edu, 801-585-0420

Sandra Knapp (Collaborator on the PBI: *Solanum* project),
Botany Research Team, Natural History Museum, London
s.knapp@nhm.ac.uk, +44 (0) 207942 5171

John Sperry (Dissertation Committee Member), Professor of Biology, University of Utah
j.sperry@utah.edu, 801-585-0379

Johanna Varner, Ph.D.

Colorado Mesa University, Department of Biological
Sciences
1100 North Avenue
Grand Junction, CO 81507

jvarner@coloradomesa.edu

(970) 248-1180

<http://johannavarner.weebly.com>

RESEARCH INTERESTS

I am interested in how climate change is affecting foraging and thermoregulatory behavior of small mammals, with special focus on those in alpine ecosystems and disturbed habitats.

EDUCATION

Doctor of Philosophy, 2015, Biology, University of Utah, Salt Lake City

GPA 4.0 / 4.0

Advisor: M. Denise Dearing

Thesis Title: Ecology & Behavior of American Pikas (*O. princeps*) in Atypical Habitats

Master of Engineering, 2007, Biological Engineering, MIT, Cambridge, MA

GPA 5.0 / 5.0

Advisor: Roger D. Kamm

Thesis Title: A microfluidic platform for three-dimensional neuron culture

Bachelor of Science, 2006, Biology, MIT, Cambridge, MA

Phi Beta Kappa, GPA 5.0 / 5.0

Minor:

Biomedical

Engineering

Humanities Concentration: French (language and literature)

EMPLOYMENT HISTORY

- 2016** **Assistant Professor of Biology**, Colorado Mesa University, Grand Junction, CO.
- 2015** **AAAS Science & Engineering Mass Media Fellow**, KQED Science, San Francisco, CA.
Reported on local science for wide-reaching radio & web news outlets. Contributed to story development, script writing, and field production of online videos. Covered a range of topics, including biology, neuroscience, seismology and engineering.
- 2010 –**
2015 **NSF Graduate Research Fellow**, University of Utah Department of Biology
Advisor: M. Denise Dearing
Research on foraging and thermoregulatory behavior of pikas (*Ochotona princeps*) in atypical habitat and pika survival and recolonization after forest fire.
- 2009 –**
2010 **Lab Manager/Technician**, University of Utah Department of Biology
Supervisor: M. Denise Dearing
Directed sampling periods to investigate Hantavirus dynamics: trained technicians, collected blood samples from rodents in the field and conducted ELISA assays.
- 2006 –**
2007 **Graduate Researcher**, MIT Department of Biological Engineering
Advisor: Roger D. Kamm

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- 2003 – Designed and patented a device to study neuron development, differentiation, and projection. Managed a large interdisciplinary team of engineers, biologists and physicians. Secured funding through a grant application to a private foundation.
- 2006 **Undergraduate Researcher**, MIT McGovern Institute and Department of Biology
Supervisor: H. Robert Horvitz
Isolated and mapped mutations in apoptosis and the cell-division cycle in *C. elegans*.

TEACHING EXPERIENCE (Last 5 years)

2016- **Assistant Professor of Biology**, Colorado Mesa University, Department of Biological Sciences. *Courses Taught*: General Human Biology (Lecture & Lab), Diversity of Organisms (Lecture & Lab), Fundamentals of Ecology & Evolution (Lab), Animal Behavior (Lecture & Lab), Mammalogy (Lecture & Lab), Senior Thesis, Maverick Milestone: Landscape & Literature in Western Colorado.

Research Mentor: Since 2010, I have mentored 16 students in independent research projects (8 of these at CMU in the last 4 years; 13 of them female). Under my guidance, these students have presented papers at national conferences and done outreach activities, including public presentations and citizen science trainings.

2014 & **Instructor, BIOL 5370 Mammalogy**, University of Utah, Department of Biology.
2015 Instructor of record for an upper-division, university biology course, 3 semesters.

2015 **Guest Lecturer, BIOL 5960 Biology, Society and Public Engagement**, University of Utah, Department of Biology. *Instructor*: Nalini Nadkarni. *Topic*: History, implementation, impact and evaluation of citizen science projects in biology.

SELECTED TRAINING: PEDAGOGY & PUBLIC ENGAGEMENT

2016 **Workshop. *Breaking the Iron Cage of Poverty***. Colorado Mesa University. Training in how to effectively relate to, communicate with and engage our students coming from the crisis of poverty.

Workshop. *Critical Thinking Unmasked: How to Infuse it Into a Discipline-Based Course*. Colorado Mesa University. Training in how to effectively teach and evaluate critical thinking skills in the classroom.

2015 **Workshop. *Science in the Mass Media***, AAAS. Training for mass media science communication, in conjunction with Science & Engineering Mass Media Fellowship.

2014 **Workshop. *Filmmaking for Scientists***, University of Utah and ScienceFilm. 5-day course on basic filmmaking techniques, including shooting & post-production.

Workshop. *Science and Public Policy*, Biological and Ecological Sciences Coalition. Training to advocate for science funding with policy makers in Washington, DC.

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- 2013 **Workshop Series. *Science Communication Fellowship***, Natural History Museum of UT.
Focus on how people learn, facilitating inquiry and translating science into stories.
- Workshop. *Science: Becoming the Messenger***, National Science Foundation.
- Workshop. *Active Learning in Your Classroom***, University of Utah Center for Teaching and Learning Excellence. Focus on techniques for undergraduate engagement in active and inquiry-based learning techniques.

SELECTED HONORS & AWARDS (Last 5 years)

- 2019 **AAAS IF/THEN Ambassador, AAAS & Lyda Hill Philanthropies.** Prestigious national honor for female STEM professionals to serve as high profile role models in the media for young women in science. Attended summit and developed press kit in Oct. 2019.
- 2018 **AAAS Early Career Award for Public Engagement in Science.** Selective and prestigious national award honoring diverse contributions to public engagement in science. Note: This is one of the highest honors available for public engagement in science & outreach.
- 2017 &
2018 **Exemplary Faculty Award, Colorado Mesa University.** Honors faculty with outstanding teaching, scholarship, service, and advising achievements each year. I have received this honor two years in a row.
- 2016 **Finalist, Golden Mole Award for Accidental Brilliance, National Public Radio.** Honors stories of “happy accidents” in scientific discovery.
- 2015 **George R. Riser Award, University of Utah Department of Biology.** Honoring outstanding research for recent Ph.D. graduates
- Outstanding Student Poster Award.** North American Pika Consortium Conference.
- Honorable Mention: Thomas G. Stockham Medal, University of Utah Graduate School.** Honoring conspicuously effective teaching by graduate students.

PEER-REVIEWED PUBLICATIONS

16. **Varner J**, Lanier HC, Duggan JM, Dizney L, Flaherty E, Connors PK, Erb LP, Yahnke C, Hanson JD. (*Submitted*) How many squirrels are in the shrubs? A lesson for comparing methods for population estimation. *CourseSource*.
15. Flaherty EA, **Varner J**, Duggan JM, Connors PK, and other Squirrel-Net authors. (*In press*). Incorporating course-based undergraduate research experiences (CUREs) into wildlife education. *The Wildlife Professional*.
14. Smith A, Beaver EA,... **Varner J**, ... (*in Press*). Ecoregional context, genetic affinity and within-species variation in response to climate. *Nature Climate Change*.

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13. Camp MG, Shipley L, Waterhouse BD*, **Varner J.** (*In Revision*). Activity patterns and foraging behavior of American pikas (*O. princeps*) differ between Craters of the Moon and alpine talus in Idaho. *Western North American Naturalist*.
 12. Kohl KD, **Varner J**, Wilkening JL, Dearing MD. (2018). Gut microbial communities of American pikas (*Ochotona princeps*): evidence for phylosymbiosis and adaptations to novel diets. *Journal of Animal Ecology*. 87:323-330.
 11. Beever EA, Hall E, **Varner J**, Loosen A, Dunham J, Gahl MK, Smith FA, Lawler J. (2017). Behavioral flexibility as a mechanism for coping with climate change. *Frontiers in Ecology and the Environment*. 15(6): 299-308. (Cover story).
 10. **Varner J**, Horns JJ*, Lambert ML*, Westberg E*, Ruff JS, Wolfenberger K*, Beever EA, Dearing MD, 2016. Plastic pikas: behavioral plasticity in low elevation pikas (*Ochotona princeps*). *Behavioural Processes* 125:63-71
 9. Wilkening JL, Ray C, **Varner J**, 2016. When can we measure stress non-invasively? Post-depositional effects on a fecal stress metric confound a multi-regional assessment of physiological stress. *Methods in Ecology and Evolution*. 6:502–513(Cover Story).
 8. **Varner J**, Lambert MS*, Horns JJ*, Dizney L, Laverty S, Beever EA, Dearing MD, 2015. Too hot to trot? Effects of wildfire disturbance on a climate-sensitive habitat specialist. *International Journal of Wildland Fire*. (Cover Story). 24(7): 921-932.
 7. Wilkening JL, Ray C, **Varner J**, 2015. Relating sub-surface water resources to physiological stress in an indicator species: implications for tracking effects of climate change in montane watersheds. *PLoS ONE* 10(3): e0119327.
 6. **Varner J**, Dearing MD, 2014. The importance of biologically relevant microclimate data in species distribution models & habitat suitability assessments. *PLoS ONE* 9(8): e104648.
 5. **Varner J**. 2014. Scientific outreach: towards effective public engagement with biological science. *Bioscience*. 64(4): 333-340.
 4. **Varner J**, Dearing MD, 2013. Dietary plasticity in pikas as a strategy for atypical resource landscapes. *Journal of Mammalogy*. 95(1):72–81.
 3. Tharin S, Kothapalli CR, Ozdinler PH, Pasquina L, Chung S, **Varner J**, DeValence S, Kamm R, Macklis JD, 2012. A microfluidic device to investigate axon targeting by limited numbers of purified cortical projection neuron subtypes. *Integrative Biology*. 4(11):1398-1405.
 2. **Varner J**, Dearing MD, 2011. Estimating Duration of Infection Using Avidity Assays: Potential Limitations & Recommendations for Improvement. *EcoHealth*. 8(4):512-518.
 1. Lehmer EM, Jones JD, Bego MG, **Varner JM**, Jeor SS, Clay CA, Dearing MD, 2010. Long-Term Patterns of Immune Investment by Wild Deer Mice Infected with Sin Nombre Virus. *Physiological and Biochemical Zoology*, 83(5):847–857.

MANUSCRIPTS IN PROGRESS (available upon request)

17. **Varner J**, Carnes-Douglas Z*, Ray C, Griswold L*, Dearing MD. (In prep.) Changes in nutritional quality of pika diet over 20 years at Niwot Ridge, Colorado. *To be submitted in January 2020.*

18 – 21. Three additional CourseSource lesson plans and a Companion Essay with the Squirrel-Net Consortium author team. *To be submitted by November 1, 2019.*

*: *Mentored undergraduate student*

SELECTED EXTERNAL RESEARCH GRANTS (Last 5 years)

2019 Alaska Fish & Game Collaborative Work Agreement, \$25,536.30 over 3 years. *Co-PIs:* Dr. Katie Christie (Alaska Fish & Game)

Western North American Naturalist Natural History Grant, \$2,000

US Forest Service Citizen Science Competitive Funding Program, \$9,943, administered by the Denver Zoo. *Co-PI's:* Megan Mueller

2018 US Forest Service Citizen Science Competitive Funding Program, \$24,300, administered by the Oregon Zoo. *Co-PI's:* Dr. David Shepherdson.

2013 Oregon Zoo Future for Wildlife Fund, \$4,000. *Co-PIs:* Dr. Erik Beever (USGS) & Steven Clark (Clark College)

SELECTED FELLOWSHIP AWARDS (Last 5 years)

2015 Mass Media Science & Engineering Fellowship, AAAS, \$5,000

2014 Graduate Research Fellowship, University of Utah Graduate School, \$17,000

SELECTED TRAVEL AWARDS (Last 5 years)

2019 Early Career Travel Award, American Society of Mammalogists, \$750

2015 Travel Award, Citizen Science Association, \$515

PATENTS

2012 Kamm RD, Asada HH, Farahat WA, Zervantonakis LK, Wood LB, Kothapalli C, Chung S, Macklis J, Tharin S, **Varner J**, Park YK, Lee KH, Tu NLT, Kim C, Inventors; 4/19/12. Device for High-Throughput Investigations of Cellular Interactions. United States patent WO2012050981. (*Master of Engineering Research*).

PROFESSIONAL SOCIETY MEMBERSHIPS

American Society of Mammalogists (ASM) Life Member, Citizen Science Association (CSA)
American Association for the Advancement of Science (AAAS), Ecological Society of America (ESA)
Union of Concerned Scientists (UCS), Society for Conservation Biology (SCB),
National Association of Science Writers (NASW)

SELECTED CONFERENCE PRESENTATIONS (Last 5 years) (full list available upon request)

- Varner J**, Beever EA, Clark SC, Abbruzzese C, Shepherdson D, Shivappa S. Engaging Citizen Scientists in Post-Fire Monitoring of Columbia River Gorge Pikas. Oral presentation, American Society of Mammalogists, 2019. Washington, DC.
- Waterhouse BD*, Camp M, Shipley LA, **Varner J**. Activity Patterns of Pikas in an Atypical, Low-Elevation Lava Habitat. Poster presentation, American Society of Mammalogists, 2019. Washington, DC.
- McFarland T*, Waterhouse BD*, **Varner J**. Seasonal patterns of stress hormone metabolites in pika latrines. Poster presentation, American Society of Mammalogists, 2019. Washington, DC.
- Varner J**, Connors PK, Brown JS, Dizney L, Duggan JD, Erb LP, Flaherty EA, Hanson J, Lanier HS, Yahnke CJ. Squirreling Around for Science: Incorporating Sciurid Behavioral Research into the Undergraduate Curriculum. Poster presentation, American Society of Mammalogists 2018. Manhattan, KS.
- Varner J**, Craighead A, Erb L, Garrouette E, Mueller M, Ray C. 2017. American pikas (*Ochotona princeps*) as a platform for public engagement in climate change. Poster presentation, American Society of Mammalogists.
- Cansler CA, Brown C, **Varner J**, Hester A. 2016. Disturbance at treeline: A mechanism for change or stability in an era of global change? Poster presentation, Mtn Clim 2016, Leavenworth, WA. (*presented by CA Cansler*).
- Varner J**, Goff J, Shivappa S. 2016. Do you hear what I hear? Integrating acoustic monitoring into a pika citizen science project. Poster presentation, American Society of Mammalogists. Minneapolis, MN.
- Beever EA, Clark SC, Abbruzzese C, **Varner J**. 2016. The Columbia River Gorge, its microclimates, vegetation and wildlife as a mesocosm for understanding constraints at range edges. Oral presentation, The Oregon Chapter of The Wildlife Society. Portland, OR. (*presented by SC Clark*).
- Varner J**, Erb L, Craighead A, Moyer-Horner L, Mueller M, Olson E, Ray C, Simpson W, Shivappa S, Weddle M, 2015. Don't crawl under a rock, look there for pikas! Engaging the

public in climate-change science through surveys of a rock rabbit, the American pika. Poster presentation, Citizen Science 2015, San Jose, CA.

*: *Mentored undergraduate student*

SELECTED SEMINARS & SYMPOSIA (Last 5 years) (full list available upon request)

2019. Invited research seminar and public science lecture about Citizen Science, Utah State University, Ecology Center.

2018. Invited research seminar, Rocky Mountain Biological Lab

2017. *Invited Haines-Morris Seminar for Women in Science* at University of Tennessee. Presented a research seminar on climate change and facilitated an informal discussion on a changing climate for women in my field.

2017. Invited research seminar and “brown bag lunch” about public engagement, University of Central Oklahoma.

2014. Invited research seminar at the American Meteorological Society monthly meeting, Salt Lake City.

SELECTED UNIVERSITY ACTIVITIES & SERVICE (partial list)

2016-18 Exhibit Design Committee, John McConnell Math and Science Center. Designed an evolutionary biology exhibit for a local science museum. The exhibit is interactive and features live, local animals.

2017 – present Catalog Description Evaluator. Three year term, ad-hoc member of all three university curriculum committees

Institutional Animal Care and Use Committee. Faculty member on the CMU IACUC.

Search Committee Member. Served on three CMU search committees.

Biology 101 Lecture & Lab Coordinator. Oversaw edits for lab manual, coordinated lab sections, and ensured consistency among lecture sections.

SELECTED EXTERNAL COMMITTEE SERVICE (partial list)

2016-present Co-chair and Co-founder, Mammalogy Education Working Grp., American Society of Mammalogists. Leading a collaborative effort to develop a course-based undergraduate research experience for diverse students to study squirrel foraging behavior. Submitted funding proposal to NSF Improving Under-graduate STEM Education (2018). Conducting training workshops at several national conferences in 2019-20. Received funding to publish several modules in CourseSource.

2010 – present – **Chair: Education, Outreach and Citizen Science Committee, North American Pika Consortium (NAPC):** Working to standardize protocols and web infrastructure for pika citizen science and education initiatives, developing open-access K-12 lesson plans for teaching about pikas and climate change. Managing NAPC Facebook page.

MIT Educational Counselor: Interviewed prospective MIT students in Utah and served as a resource and campus connection for students and parents

2016 - 2019 – **Committee on Diversity and Education, Ecological Society of America.** Helped ESA increase diversity in ecology and bring ecological education to underserved audiences. Spearheaded collaborations with the Science Communication Section leadership. Received certificate for outstanding service to the society.

2010-2017 – **Public Education Committee, American Society of Mammalogists:** Developed workshops for K-12 teachers in mammalogy education and a workshop for scientists to participate in public engagement.

2015

Conference Communications Committee, Citizen Science Association. Managed social media communications for the Citizen Science 2015 Conference. Developed hashtags #CitSci2015 & #WhyICitSci

2012-present

Ad-Hoc Peer-Reviewer: J. of Mammalogy, Integrative Zoology, Western North American Naturalist, Frontiers in Ecology & the Environment, J. of Wildlife Management, Ecology and Evolution, Ecosphere, Functional Ecology, Biology Letters, Graduate Women in Science Fellowship Selection Committee

SELECTED OUTREACH & COMMUNITY EDUCATION (*partial list; Last 5 years*)

2018 – **Family Science Days, AAAS Annual Meeting.** Presentation in an informal, public setting.

@MeetAScientist Twitter Takeover. Spent a day coordinating and producing content for the AAAS public-science initiative on twitter.

2014

INSPIRE: Initiative to Bring Science Programs to the Incarcerated. Presented a lecture about pika ecology to incarcerated men in the Salt Lake County Jail System

Natural History Museum of Utah Science Communication Fellow. Received training in engaging public audiences in the process of scientific inquiry and developed a pika-related presentation and activity for NHMU’s “Scientist in the Spotlight”

2016 - present

Congressional Visits Day, Biological & Ecological Science Coalition. Discussed the value of federally funded science with my Utah Congressmen in Washington, DC.

Colorado Pika Partners & Front Range Pika Project (FRPP). Initiated a partnership to establish an outpost of the FRPP on the western slope, which grew into a state-wide expansion of the project. Piloting new protocols and selecting sites in the Grand Mesa and San Juan mountain range. Received funding from the US Forest

2011 – present Service Citizen Science Fund to develop opportunistic survey protocols for volunteers throughout the state. Presented at volunteer recruitment/retention events in the Denver area.

2011-2015 **Co-founder, Cascades Pika Watch:** Helped develop a citizen-scientist program to track pika range, status, and distribution in the Pacific Northwest; Created training materials for volunteers to effectively identify pikas in the field. Collaborated with volunteers to develop an acoustic monitoring platform for detecting pikas in atypical habitats; volunteers participated in writing grants, analyzing data, and presenting results at a national conference. Received funding from the US Forest Service Citizen Science Fund to train volunteers to conduct abundance surveys following the Eagle Creek Fire; I trained 40 volunteers in 2018 and will train more this summer. I also continue to interact with volunteers via Facebook group.

2012 – 2015 **Director, Uintas Pika Watch:** Developed a long-term student-scientist field research program to track pika population size in the Uinta Mountains; Supporting lessons tie field experience to educational standards. Students present their original research projects to scientists at the University in “Pika Palooza,” a poster session-style forum

Jane Goodall Environmental Middle School (JGEMS): Involving students in field research on pika survival and recolonization after a forest fire. Students analyze data during the school year and present results to peers, families, and local agencies.

SELECTED MEDIA COVERAGE (Last 5 years) *(full list available upon request)*

2018 **“Pikas: Cute Animal, Serious Science.”** *(outlet geared toward middle schoolers)*
Tumble Podcast: <http://www.sciencepodcastforkids.com/single-post/2018/04/19/Pikas-Cute-Animal-Serious-Science>

Oregon Field Guides: “Pika” (Research & citizen science highlighted on a TV Episode)
Oregon Public Broadcasting: <http://www.opb.org/television/programs/ofg/segment/pi/>

2016 **“Whoops! 12 Tales of Accidental Brilliance in Science.”** Golden Mole Award Finalist.
NPR: <http://www.npr.org/2016/02/24/467805055/whoops-twelve-theses-of-accidental-brilliance-in-science>

2015 **“Have pikas peaked?”**
National Wildlife Magazine, Dec./Jan. 2016 issue

“Climate-vulnerable pikas may be surprisingly resilient to wildfire”
High Country News: <https://www.hcn.org/articles/after-wildfire-whither-pika-climate-wildlife>

‘I Love’ video series: U. researcher studies pikas with a passion
Salt Lake Tribune: <http://www.sltrib.com/news/2510852-155/i-love-video-series-u-researcher>

“Research Spotlight: Pikas in Extreme Habitats: Teaching Natural Wonder in the Uintas and Beyond”
Utah Sustainability Resource Center Blog: <https://sustainableutah.wordpress.com/2015/04/02/research-spotlight-pikas-in-extreme-habitats-teaching-natural-wonder-in-the-uintas-and-beyond/>

SELECTED ARTICLES WRITTEN FOR THE PUBLIC (Last 5 years) (full list available upon request)

- 2019 **#MySciComm: Johanna Varner on the personal interactions that make a big difference**
ESA Communication & Engagement Section Blog: <https://www.esa.org/communication-engagement/2019/04/03/my-scicomm-johanna-varner-on-the-personal-interactions-that-make-a-big-difference/>
- 2016 **How a Wildfire Accidentally Taught us About Pika Resilience.**
Mountain Research Initiative Blog: <http://www.blogs-mri.org/?p=1009>
- 2015 **Clips from AAAS Mass Media Fellowship at KQED Science.**
<http://ww2.kqed.org/science/author/jvarner/>
- #WhyICitSci at #CitSci2015.** Sharing what we love most about citizen science.
Citizen Science Association Newsletter.
<https://storify.com/johannavarner/whyicitsci>
- 2014 **Sketch Your Science at #ESA2014.** Mountain researchers sketch their science and tweet snappy stories at ESA's annual conference in Sacramento.
Ecological Society of America, EcoTone Blog
<https://www.esa.org/esablog/ecology-and-society/sketchyourscience-at-esa-2014>
- Uintas Pika Watch or: How I learned to stop worrying and love middle schoolers.**
Union of Concerned Scientists, The Equation Blog
<http://blog.ucsusa.org/uintas-pika-watch-or-how-i-learned-to-stop-worrying-and-love-middle-schoolers-717>

SCIENTIFIC CONSULTING EXPERIENCE

- 2014 **Bonneville Power Administration.** Offered management recommendations to
& 2019 minimize disturbance to pikas in Oregon's Columbia River Gorge during repair and construction of transmission lines near low-elevation talus slopes.
- 2014 **BBC.** Scientific consultant for a segment about low-elevation pikas, for a natural history documentary series about western North America.

Thomas R. Walla, Ph.D.
Department of Biological Sciences
Colorado Mesa University
Grand Junction, Colorado

Education:

Ph.D. Biology: Ecology and Evolution, University of Oregon, Eugene, 2000

B.A. Economics, University of California, San Diego, 1991

Teaching:

BIOL 101 General Human Biology

BIOL 101L General Human Biology Laboratory BIOL 105 Attributes of Life

BIOL 105L Attributes of Life Laboratory

BIOL 208 Fundamentals of Ecology and Evolution

BIOL 208L Fundamentals of Ecology and Evolution Laboratory

BIOL 211 Ecosystem Biology

BIOL 211L Ecosystem Biology Laboratory

BIOL 331 Insect Biology

BIOL 331L Insect Biology Laboratory

BIOL 387 Structured Research

BIOL 405 Advanced Ecological Methods

BIOL 405L Advanced Ecological Methods Laboratory

BIOL 406 Plant-Animal Interactions

BIOL 407 Tropical Field Biology

BIOL 415 Tropical Ecosystems

BIOL 483 Senior Thesis

BIOL 487 Advanced Research

Innovative Materials/Activities

Developed BIOL 407: Tropical Field Biology in Ecuador: This field course takes students to the heart of the Amazon rainforest where they learn field ecology techniques to study tropical systems. 11 successful trips.

Taxonomy: a social approach: Developed an approach to teaching insect taxonomy in BIOL 331 Insect Biology Lab that makes use of projected microscope fields that allow students to work together as a group to recognize key taxonomic characteristics and make dichotomous key choices.

Supervision of Student Research/Project(s)

2014

BIOL 387: Structured Research Leah Temple: The role of elevation and temperature driving developmental plasticity in larval lepidoptera in Eastern Ecuador.

BIOL 387: Structured Research Sam Jessen (2cr) : Lepidoptera specimen mounting, curation and databasing

2013

BIOL 387: Structured Research Jade Moret (5cr) Investigation of host plant switching in larval lepidoptera in a Montane forest of Ecuador.

BIOL 387: Structured Research Kelsie Antonelli (5cr) Investigation of the role of elevation in determining host plant switching ability in larval lepidoptera in Eastern Ecuador.

BIOL 387: Structured Research Tyler Hutchinson (3cr) Lepidoptera taxonomic sampling and specimen curation in a montane rainforest of Ecuador

BIOL 387: Structured Research Elijah Neymark (2cr) Lepidoptera taxonomic sampling and specimen curation in a montane rainforest of Ecuador

BIOL 387: Structured Research Alicia Crespin (summer) : The effects of elevation on larval development rates in Eastern Ecuador.

2012

BIOL 387: Structured Research Alicia Crespin (summer) : The effects of elevation on larval development rates in Eastern Ecuador.

BIOL 387: Structured Research Jessica Hartney (3cr) : Developing a photographic guide to moth families common at the night light in Montane Ecuador.

BIOL 387: Structured Research Ashley Lucks (1cr) : Insect specimen mounting, curation and databasing
BIOL 387: Structured Research Saray Lira (2cr) : Lepidoptera specimen mounting, curation and databasing
BIOL 387: Structured Research Kelsie Betz (4cr) : Lepidoptera specimen mounting, curation and databasing

2011

BIOL 387: Structured Research: Katherine Sams (2cr) : Digitization of tropical butterfly collection and posting to Encyclopedia of Life website.

BIOL 487: Advanced Research: Jessica Hogue (4cr): Summer REU in Ecuador collecting and rearing *Eois* caterpillars to test patterns of ecological speciation and population genetic structure in a tri-trophic plant-caterpillar-parasitoid system.

BIOL 487: Advanced Research: Emily Breiner (2 cr): Testing hypothesis regarding elevation and caterpillar development time based on literature reviews.

2010

BIOL 487: Advanced Research: Brittney McKelvey (3cr) Describing the natural history of caterpillars in an Ecuadorian cloud forest.

BIOL 487: Advanced Research: Katharine Williams (3 cr). Describing the natural history of caterpillars in an Ecuadorian cloud forest.

BIOL 387: Structured Research: Jessica Hogue (6cr). Morphospecies description and diversity analysis of a *Chusquea* feeding geometrid caterpillar community.

BIOL 387: Structured Research: Emily Breiner (6cr). Morphospecies description and diversity analysis of a *Chusquea* feeding geometrid caterpillar community.

2009

BIOL 387: Structured Research: Brittany McKelvey (6cr) Describing the natural history of caterpillars in an Ecuadorian cloud forest. 5 month REU funded field experience.
BIOL 387: Structured Research: Katharine Williams (6cr): Describing the natural history of caterpillars in an Ecuadorian cloud forest. 5 month REU funded field experience.

2008

BIOL 387: Structured Research: Josh Jahner: 6 credits: Measuring mortality in hesperiid caterpillars in an Ecuadorian cloud forest.

2007

BIOL 387: Structured Research: 2 students: 2 cr each: Digitization of lepidoptera collections for online publication. BIOL 487: Advanced Research: 1 student: 3 cr. Building photographic keys for entomology students.

2006

BIOL 387: Structured Research: 7 students: approx 2 credits each: Identification and databasing of fruit-feeding nymphalid butterflies from a neo-tropical forest, theoretical approach to testing neutral models in tropical butterfly communities, entomological curation.
BIOL 487: Advanced Research: 3 students: 3 credits each. Entomological curation by Patti Susman. Drafting of *Eois* host specificity research by Toni Walters.

2004

Spring: 5 students: approx 2 credits each: Projects included diversity analysis, alpha taxonomy of butterfly samples from the upper Amazon, databasing, web site construction
Fall 4 Students: approx 2 credits each: Projects included diversity analysis, alpha taxonomy of butterfly samples from the upper Amazon, databasing, web site construction
Toni Walters: Host plant specificity of *Eois* caterpillars in Ecuador.

2003

1 student 6 credits: Toni Walters: Host plant specificity of *Eois* caterpillars in Ecuador.

Scholarship and Creative Work:

Journal Articles

- Walla, TR., and Greeney, HF. 2012 Under cover of darkness, caterpillars take flight: The immature stages and feeding ecology of the Glasswinged Butterfly, *Oleria baezana* (Ithomiinae) in Eastern Ecuador. *Journal of Insect Science*. 12: 106.
- Jarle Tufto, Russell Lande, Thor-Harald Ringsby, Steinar Engen, Bernt-Erik Sæther, Thomas R. Walla and Philip J. DeVries 2012. Estimating Brownian motion dispersal rate, longevity and population density from spatially explicit mark-recapture data on tropical butterflies. *Journal of Animal Ecology* vol 81 Issue 4 pgs 756-769.
- Rodriguez-Casteneda, Genoveva; Dyer, Lee; Brehm, Gunnar; Connahs, Heidi; Forkner, Rebecca; Walla, Thomas R. 2010.
- Tropical Forests Are Not Flat *Ecology Letters*. Volume 13, Iss. 11. 1348-1357.
- Greeney, H. Walla, T. Jahner, J. Berger R. 2010. Shelter building behavior of *Pyrrhopyge papius* (Lepidoptera: Hesperiiidae) and the use of the Mayfield method for estimating survivorship of shelter-building Lepidopteran larvae. *Zoologia* Vol. 27 (6): 867-872.

- Greeney, H., Penz, C., DeVries, P. Walla, T. 2010. A possible function of the spatulate setae surrounding the papillae anales of Sarota butterflies. (Riodinidae: Helicopini). *Journal of the Lepidopterists' Society* Vol. 64 Number 4 2010.
- Greeney, H. F., Walla, T.R., and Lynch, R.L. 2010. Architectural changes in larval leaf structures of *Noctuana haematospila* (Lepidoptera: HesperIIDae) between host plant species with different leaf thicknesses. *Zoologia*. Vol. 27 no. 1.
- Jost, L.J., DeVries, P.J., Walla, T.R., Greeney, H.F., Chao, A., Ricotta, C. 2010. Partitioning diversity for conservation analyses. *Diversity and Distributions* Vol. 16 Issue 1, pp. 65-76.
- Greeney, H.F., Dyer, L.A., DeVries, P.J., Walla, T.R., Salazar, L., Simbana, V.W., Salgaje, L. 2010. Early stages and natural history of *Perisama oppellii* (Latreille, 1811) (Nymphalidae, Lepidoptera) in eastern Ecuador. *Kempffiana* 6: 16-30.
- Greeney, H. F., T. W. Pyrcz, L. A. Dyer, M. Sanchez Z., & T. R. Walla. 2010. The early stages and natural history of *Corades medeba* Hewitson, 1850 in eastern Ecuador (Lepidoptera, Nymphalidae, Satyrinae, Pronophilina). *Tropical Lepidoptera* 19: 10-15.
- Dyer, L.A., Walla, T.R., Greeney, H.F., Stireman III, J.O., Hazen, R.F. 2010. Diversity of interactions: a metric for studies of biodiversity. *Biotropica*. 42: 281-289.
- Greeney, H.F, DeVries, P.J., Penz C.M., Granizo, R.B., Connahs, H, Stireman III, J.O., Walla, T.R., Dyer, L.A., 2009. The early stages and natural history of *Antirrhea adoptive porphyrosticta* (Watkins, 1928) in eastern Ecuador (Lepidoptera: Nymphalidae: Morphinae). *Journal of Insect Biology* Vol. 9, Article 26.
- Connahs, H., Rodriguez-Castañeda, G., Walters, T., Walla, T.R. & Dyer, L.A. 2009. Geographic variation in host- specificity and parasitoid pressure of an herbivore (Geometridae) associated with the tropical genus *Piper* (Piperaceae). *Journal of Insect Science* Vol 9. Article 28.
- Walla, T.R., Engen, S., De Vries, P.J. and Lande. R. 2004. Modeling vertical beta diversity in tropical butterfly communities. *Oikos* 107: 610-618.
- Engen, S., Walla T.W., DeVries, P.J. 2002. Analyzing spatial structure of communities by the two-dimensional Poisson lognormal species abundance model. *American Naturalist*.
- DeVries, P.J. & T.R. Walla. 2001. Long-term spatial and temporal species diversity in a neotropical fruit-feeding nymphalid butterfly community. *Biol. J. Lin. Soc.* 74: p.1-15
- Lande, R., DeVries, P.J. & T.R. Walla. 2000. When species accumulation curves intersect: ranking diversity using small samples. *Oikos* 89:601-605.
- DeVries, P.J., C.M. Penz and T.R. Walla. 1999. The biology of *Batesia hypochlora* from an Ecuadorian rainforest (Lepidoptera, Nymphalidae). *Tropical Lepidoptera* 10: 43-46.
- DeVries, P.J., T. Walla & H. Greeney. 1999. Species diversity in spatial and temporal dimensions of fruit-feeding butterflies from two Ecuadorian rainforests. *Biol. J. Lin. Soc.* 68: 333-353.
- Greeney, H.F, M Lysinger, TR Walla, & J Clark 1998. First description of the nest and egg of the Tanager Finch (*Orreothraupis arremenops*) with additional notes on behavior. *Ornitologia Neotropical* 9: 205-207.

Websites

- Dyer, L.A., Miller, J.S., Rab Green, S.B., Gentry, G.L., Greeney, H.F., and T.W. Walla. (2014). Caterpillars and parasitoids of the Eastern Andes in Ecuador. <http://www.caterpillars.org>.

Other

Non-peer Reviewed:

Walla, Thomas and Narvaez, Edwin 2003. A photographic guide to the plants of Papallacta Pass, Ecuador.

Grants

- 2013: Larval development along an Altitudinal Gradient in the Andes. Author: Walla, T
Source: Supplemental Research Experience for Undergraduates National Science Foundation
Funded 2013: \$7,500 for one student.
- 2012: Lepidoptera host switching and the effects of elevation. Author: Walla, T
Source: Supplemental Research Experience for Undergraduates National Science Foundation
Funded 2012: \$7,500 for one student.
- 2011: Larval development along an Altitudinal Gradient in the Andes. Author: Walla, T
Source: Supplemental Research Experience for Undergraduates National Science Foundation
Funded 2011: \$7,500 for one student.
- 2010 - 2013 Caterpillars and Parasitoids of the Ecuadorian Andes (Collaborative) 3rd Renewal
Authors: Lead PI: Lee Dyer (University of Nevada Reno), Co-PI's: Walla, T (Mesa State), Shaw S (University of Wyoming), Whitfield J. (University of Illinois Champagne), Stireman J. (Wright State University) Forister, M. (University of Nevada, Reno)
Source: National Science Foundation DEB Biological Surveys and Inventories Funded June 2010- June 2013. \$171,000
- 2010: Dissecting Microscope with Leica Automontage Imaging System Authors: Lead PI: McQuade, K. Co-PI's: Walla, TW., Palmer, AP. Source: National Science Foundation Equipment Grant, Funded: \$45,000
- 2010: Teaching dissecting microscope with digital video imagery.
Authors: Lead PI: Walla TW, Co-PI's: Palmer, McQuade, McCallister, Beckett. Source: Colorado Mesa University Professional Development Fund
Funded: \$3000
- 2010: Herbivore diversity on *Chusquea* (Poaceae) in a montane rainforest. Author: Walla, T
Source: Supplemental Research Experience for Undergraduates National Science Foundation
Funded: \$7,500 for one student
- 2009: *Chusquea* (Poaceae) caterpillar community structure and diversity.
Source: Supplemental Research Experience for Undergraduates National Science Foundation
Author: Walla, T.
Funded: April 2009 for 2 students \$16,000
- 2008: Mortality due to predation in Hesperiid caterpillars in Ecuador.
Source: Supplemental Research Experience for Undergraduates National Science Foundation
Author: Walla, T.
Funded: April 2008: \$7,500.00 for one student
- 2007: Strategic Planning Goals Grant: Developing online teaching strategies. Source: Mesa State College
Author: Walla, T.
Funded June 2007 \$2,800.00
- 2007-2010 Caterpillars and Parasitoids of the Ecuadorian Andes (Collaborative).
Authors: Lead PI: Lee Dyer (University of Nevada Reno), Co-PI's: Walla, T (Mesa State College), Shaw S (University of Wyoming), Whitfield J. (University of Illinois Champagne), Stireman J. (Wright State University)

- Source: National Science Foundation Biological Surveys and Inventories Funded 2007: \$98,000.00
- 2006: Measuring caterpillar diversity in the eastern Andes.
Source: Supplemental Research Experience for Undergraduates National Science Foundation
Author: Walla, T.
Funded: May 2006: \$6,500.00 for one student
- 2005: Host specificity of *Eois* (Geometridae) caterpillars in an Ecuadorian cloud forest. Source: Supplemental Research Experience for Undergraduates National Science Foundation Author: Walla, T.
Funded: May 2005: \$6,500.00 for one student
- 2004: Caterpillars and Parasitoids of the Ecuadorian Andes (Collaborative).
Authors: Lead PI: Lee Dyer (University of Nevada Reno), Co-PI's: Walla, T (Mesa State College), Shaw S (University of Wyoming), Whitfield J. (University of Illinois Champagne), Stireman J. (Wright State University)
Source: National Science Foundation Biological Surveys and Inventories Funded: June 2004-June 2007 \$43,000
- 2004: Academic Enrichment Fund: Invited Scientists to Enrich Tropical Field Biology 407
Author: Walla, T.
Source: Mesa State College Academic Enrichment Fund. Funded 2004: \$1000
- 2003: Academic Enrichment Fund: Invited Scientists to Enrich Tropical Field Biology 407
Author: Walla, T.
Source: Mesa State College Academic Enrichment Fund. Funded 2003: \$1000
- 2003: Undergraduate Research and Education Workshop of the First Annual Ecuador Cloud Forest Tropical Research and Education Conference
Author: Walla, T.
Source: Mesa State College Professional Presentation Funds. Funded 2003: \$1,180.00
- 2003: C-RUI: Plant-herbivore interactions in Montane and Lowland Neo-tropical Rainforests.
Source: National Science Foundation Collaborative Research at Undergraduate Institutions. Amount Requested: \$463,400.00 Rejected: June 2003.

Sabbaticals

Sept 2008- May 2009: Research on Diversity Metrics and Caterpillars and Parasitoids of the Eastern Andes in Ecuador.

Fulbright Scholar

2008-2009: Collaborative Advances in Diversity Measures and Museum Curation: This project developed collaborations with museum personnel and students at the Museo de Ciencias Naturales in Quito, Ecuador.

Service 2003-Present:

University

2014

Distance Learning Committee Tenure and Promotion Committee

2013

Distance Learning Committee Tenure and Promotion Committee

2012

Library Committee Representative Tenure and Promotion Committee Pre-tenure and Promotion Committee

2011

Library Committee Representative Tenure and Promotion Committee Pre-tenure and Promotion Committee

2010

Mesa State College Strategic Plan Committee Library Committee Tenure and Promotion Committee

2009

Library Committee

2008

Graduate Council Member Curriculum Committee Membe

2007

Graduate Council Curriculum Committee

2004

College Travel Committee Graduate Council Lectures and Forums Committee

Department

2012

Chair: Physiologist search committee

2010

Equipment Committee

Search Committee: Botany Search Search Committee: Physiology Search

2009

Biology Club Co-Advisor

2007

Biology Dept. Equipment Committee Biology Club Co-advisor

Biology Dept. Travel Committee member

2006

Biology Dept. Travel Committee member Faculty search committee member Botany faculty search committee member Cell Biology

2004

Biology dept. Travel Committee

Advising:

University level

2007 Mesa Madness

2004 Mesa Madness

Department level

2012: 64 Advisees

2011: 51 Advisees

Honors and Awards:

Exemplary Award 2010, 2011, 2013

Professional Experience:

2001 – present: Professor of Biological Sciences, Colorado Mesa University

Denita M. Weeks
Ph.D. Candidate

The University of Memphis
Department of Biological Sciences
108 Ellington Hall

Cell: (616) 551-6834
dmweeks@memphis.edu

EDUCATION

- Ph.D. Biology** • The University of Memphis • 2013-present
Dissertation: **Potential Mitigation of *Chytridiomycosis* with Biopesticides: A natural, unexplored strategy**
Advisor: Dr. Matthew J. Parris

- M.S. Biology** • California State University, Northridge (CSUN) • 2013
Thesis: **Comparative Thermal Tolerances, Performance Eurythermy, and Energy Budgets of the World's Southernmost Gecko with Implications for Changing Climate**
Advisor: Dr. Robert E. Espinoza

- B.S. Biology (Animal Emphasis)** • Grand Valley State University, Allendale, MI • 2008

CONTINUING EDUCATION

- Ranaviruses: Emerging Pathogens of Ectothermic Vertebrates • 69 credit hours
Global Ranavirus Consortium, Inc. • The University of Tennessee-Knoxville • 2016

PROFESSIONAL EXPERIENCE

Teaching

- 2017 Anatomy & Physiology Lecture & Lab Dual Enrollment Course • University of Memphis/Central High School (hybrid course)
- 2017-18 Anatomy & Physiology Lecture • University of Memphis (hybrid course)
- 2017 -18 Principles of Biology Lab I & II • Christian Brothers University
- 2016 & 2018 Herpetology Lecture & Lab (co-instructor) • University of Memphis
- 2016 Biology of Organisms Lab • University of Memphis
- 2015 Microbiology Lab • University of Memphis
- 2009-11 Human Anatomy Lab (Introductory & Advanced) • CSUN

Laboratory Technician

- 2006-08 Biology Department • Grand Valley State University

Undergraduate Research Assistant:

- 2006 Assistant to Dr. Stephen Burton and research student: project assessed the suitability of golf course habitat for amphibian diversity • Grand Valley State University

ADDITIONAL RESEARCH EXPERIENCE

Graduate Research:

- 2010 Graduate Assistant • Tropical Biology and Conservation Program, CSUN. Completed two student research projects in Ecuador; assisted undergraduates with project design & statistical analysis.
- 2010-2011 M.S. Thesis research in Argentina on: **“Comparative Thermal Tolerances, Performance Eurythermy, and Energy Budgets of the World’s Southernmost Gecko with Implications for Changing Climate”**

Undergraduate Research:

- 2008 **Factors influencing calling male green frogs (*Rana clamitans*) at Pierce Cedar Creek Institute**, Faculty in Residence Intern with Dr. Stephen Burton, funded by Pierce Cedar Creek Institute (PCCI).
- 2007 **Green Frog (*Rana clamitans*) calling habitat associations: Are males selecting calling habitat more closely associated with egg-laying or predator protection?**, funded by the GVSU Ronald E. McNair Scholars Program and PCCI Undergraduate Research Grants for the Environment (URGE). Mentor: Dr. Stephen Burton

GRANTS

Potential mitigation of amphibian disease with biopesticides: A natural, unexplored strategy, Herpetologists’ League E. E. Williams Research Grant (\$581) • 2015

Impacts of larval stress on development of adult skin defenses in anurans • SICB FGST Grant (\$1300), 2015
Received training in: ELISA assays, Antimicrobial Peptide purification

Potential mitigation of amphibian disease with biopesticides: A natural, unexplored strategy, ASIH Gaige Award (\$500), 2014

Potential mitigation of amphibian disease with biopesticides: A natural, unexplored strategy, Sigma Xi Grants-in-Aid of Research (\$975), 2014

Impacts of larval stress on development of adult skin defenses in anurans, Chicago Herpetological Society (\$1000), 2014

Fundamental niche modeling and implications of global climate change for the world’s southernmost gecko, SSAR Grant-in-Herpetology Travel Award (\$500), 2011

Fundamental niche modeling and implications of global climate change for the world’s southernmost gecko, *Homonota darwini*, ASIH Gaige Award (\$500), 2010

Fundamental niche modeling and implications of global climate change for the world’s southernmost gecko, *Homonota darwini*, CSUN D.H. Norris Field Trip Minigrant (\$250), 2010

Fundamental niche modeling and implications of global climate change for the world’s southernmost gecko, *Homonota darwini*, Sigma Xi Grants-in-Aid of Research (\$1000), 2010

Fundamental niche modeling and implications of global climate change for the world's southernmost gecko, *Homonota darwini*, CSUN Thesis Support Grant (\$1000), 2009

Green Frog (*Rana clamitans*) calling habitat associations: Are males selecting calling habitat more closely associated with egg-laying or predator protection?, PCCI Undergraduate Research Grants for the Environment (URGE) (\$3000), 2007

PROFESSIONAL AFFILIATIONS

Sigma Xi, The Scientific Research Society • 2012-present

Chicago Herpetological Society • 2011-present

American Society of Ichthyologists and Herpetologists • 2010-present

Herpetologists League • 2010-present

Society for the Study of Amphibians and Reptiles • 2010-present

Society for Integrative and Comparative Biology • 2010

Toastmasters International • 2007-2008

Ronald E. McNair Scholar Program • 2005-present

Michigan Society of Herpetologists • 2005

Indiana Declining Amphibian Population Task Force (DAPTF) • 2004

AWARDS

Mack I. Johnson Memorial Research Award for Outstanding Graduate Student, California State University-Northridge (\$2000), 2014

University of Memphis Society Doctoral Fellowship, The University of Memphis (\$1770), 2014

Van Vleet Memorial Doctoral Award, The University of Memphis (\$16000), 2013

The Herpetologists' League Graduate Research Award (Best Oral Presentation), The Herpetologists' League, Joint Meeting of Ichthyologists and Herpetologists, Minneapolis, MN, 2011

CSUN Achievement Award (\$2000), 2010

Seibert Award (Best Oral Presentation) in Physiology/Morphology, Society for the Study of Amphibians and Reptiles, Joint Meeting of Ichthyologists and Herpetologists, Providence, RI, 2010

CSUN Graduate Fellowship for Outstanding Research Promise in Science and Mathematics (\$5000), 2010

CSUN Associated Students Northridge Achievement Award (\$2000), 2010

CSUN Graduate Equity Fellowship (\$2000), 2009

Toastmasters Competent Communicator Award, 2008

PROFESSIONAL SERVICE

Joint Meeting of Ichthyologists and Herpetologists Session Moderator, Austin, TX • 2017

Tennessee Academy of Sciences Oral Presentation Judge, The University of Memphis, 2015

Graduate Women in Science, The University of Memphis
President, 2017-present
Vice President & Cofounder, 2014-2016

Biological Sciences Graduate Student Association, The University of Memphis
President, 2015-2016
Secretary, 2014-2015

FrogWatch USA, Memphis Chapter, Co-coordinator, Wolf River Conservancy, 2014-

Biology, Ecology, and Evolution Reading Club Secretary, CSUN, 2009-2011

PRESENTATIONS

Weeks, D. M. and M. J. Parris. 2017. **Immunity is Skin Deep: Considering Microbial Pesticides as a Disease Mitigation Strategy for Chytridiomycosis**
Joint Meeting of Ichthyologists and Herpetologists, Austin, TX

Weeks, D. M. and M. J. Parris. 2017. **Bacteria used in organic agriculture inhibit growth of a pathogenic amphibian fungus in vitro**
The University of Memphis, Student Research Forum (poster), 2017

Weeks, D.M. 2011. **When warmer isn't better: Subzero Tolerances and Performance Eurythermy for the World's Southernmost Gecko**
Joint Meeting of Ichthyologists and Herpetologists, Minneapolis, MN

Weeks, D.M. 2011. **Eurythermy, subzero tolerances, and the potential for range expansion following global warming in the world's southernmost gecko**
California State University Northridge, Student Symposium, 2011

Weeks, D.M. and R. E. Espinoza. 2010. **Geckos on ice: unexpected thermal tolerances and temperature-dependent performance of the world's southernmost gecko**
Joint Meeting of Ichthyologists and Herpetologists, Providence, RI

Weeks, D.M. 2010. **Geckos on ice: unexpected thermal tolerances of the world's southernmost gecko.**
California State University Northridge, Sigma Xi Symposium, 2010

Implications of global climate change for the world's southernmost gecko
California State University Northridge, Student Symposium, 2010

What does your pyramidalis muscle do for you?
Grand Valley State University, Student Scholars Day (poster)

Green Frog (*Rana clamitans*) calling habitat associations: Are males selecting calling habitat more closely associated with egg-laying or predator protection?

Grand Valley State University, Student Scholars Day, 2008

West Michigan Regional Undergraduate Science Research Conference (poster), 2007

PCCI, *URGE* 2007 Report Meeting, 2007

Pennsylvania State University, Ronald E. McNair 2007 Summer Research Conference, 2007

Factors influencing calling male green frogs (*Rana clamitans*) at Pierce Cedar Creek Institute

PCCI, *Faculty in Residence* Report Meeting, 2008

NON PEER-REVIEWED PUBLICATIONS

Weeks, D.M. and S.R. Burton. 2007. Green Frog (*Rana clamitans*) calling habitat associations: are males selecting calling habitat more closely associated with egg-laying or predator protection? *GVSU McNair Scholars Journal* Vol.11:91-101.

(also as final report to PCCI)

Burton, S., D. Weeks, R. Fouty, and B. Lodewyck. 2008. Factors influencing calling male Green Frogs (*Rana clamitans*) at Pierce Cedar Creek Institute. Final Report to PCCI.

PEER-REVIEWED PUBLICATIONS

Weeks, D.M. and M. J. Parris. In preparation. A *Bacillus thuringiensis* subsp. *kurstaki* biopesticide at environmentally relevant concentrations does not reduce hatching success or tadpole survival in *Lithobates sphenoccephalus*

Weeks, D. M. and R. E. Espinoza. In Review. Performance eurythermy in a cold climate gecko. *Journal of Experimental Zoology*.

Hanlon, S.M., J.R. Henson, B. Patillo, **D. Weeks**, J.L. Kerby, and J.E. Moore. 2016. No occurrence of ranaviruses in reptiles from Wapanocca National Wildlife Refuge in Arkansas, USA. *Herpetological Review* 47: 606-607.

Weeks, D.M. and R.E. Espinoza. 2013. Lizards on ice: comparative thermal tolerances of the world's southernmost gecko. *Journal of Thermal Biology* 38: 225-232.

CURRICULUM VITAE

Steven D. Werman, Ph.D.

Professor, Department of Biological Sciences
Colorado Mesa University
1100 North Ave.
81501-3122
e-mail: swerman@coloradomesa.edu
Phone: 970 248-1909

EDUCATION:

Research Fellow in Molecular Biology, California Institute of Technology, Pasadena, CA
1986-89 (Postdoc)
Ph.D. 1986 Biology, University of Miami, Coral Gables, FL
M.S. 1980 Biology, California State University, Long Beach, CA
B.S. 1977 Zoology, California State University, Long Beach, CA
A.S. 1975 Biology, El Camino College, Torrance, CA

WORK EXPERIENCE:

Assistant Vice President of Academic Affairs CMU 2006-10
Department Head, Biological Sciences CMU 2004-05
Interim Dean, School of Natural Sciences and Mathematics CMU 2003- 05
Chair, Department of Biological Sciences, CMU 1998-03
Professor, CMU 1997 to present
Associate Professor, Department of Biology, CMU 1993-97
Assistant Professor, Department of Biology, CMU 1989-93
Lecturer in Molecular Biology, Department of Biology, California State University,
Dominguez Hills, CA, 1989
Lecturer in Developmental Biology, Dept. of Biology, University of Miami, 1984-86
Lecturer in General Biology, Department of Biology, University of Miami, 1983
*Mesa State College became Colorado Mesa University in 2011

AREAS OF ACADEMIC SPECIALIZATION:

Herpetology, Molecular Genetics, Evolution, Systematics, Biogeography, Tropical Biology, Zoology,
Anatomy and Physiology, Pathophysiology, Venom Biology

RESEARCH INTERESTS:

My research has focused on the systematics, biogeography and evolution of Neotropical reptiles and animal venoms. I have used information of morphology, allozymes and DNA sequence information to generate hypotheses of relationship among pitvipers using cladistic methods. These relationships have been used to refine and understand the systematics, evolution and biogeography of these reptiles. I am also

interested in the genetic analysis of gene flow and species differentiation in amphibians and the evolution, characterization and medical aspects of reptilian venoms.

COURSES TAUGHT (at CMU):

BIOL 101 (lecture)
BIOL 102/102L General Biology
BIOL 105/105L Attributes of Living Systems
BIOL 106/106L Zoology
BIOL 196 Topics: Herpetology
BIOL 209/209L Human Anatomy and Physiology
BIOL 241 Pathophysiology on site and online
ESSL 290 Maverick Milestone: Biology as Art
BIOL 301/301L Principles of Genetics
BIOL 310/310L Developmental Biology, onsite and online
BIOL 333 Marine Biology
BIOL 387 Structured Research
BIOL 396 Topics: Biotechnology and Bioinformatics, Venoms, Venoms and Poisons,
Medically Important Vertebrates (some onsite some online)
BIOL 403 Evolution
BIOL 413/413L Herpetology
BIOL 425 Molecular Genetics
BIOL 433 Marine Biology
BIOL 483 Senior Thesis
BIOL 487 Advanced Research
BIOL 482 Senior Research
BIOL 496 Topics: Animal Envenomation, Biology of Hematophagy, Spider Venoms,
Medical Embryology, Biology of Tetrodotoxin (some onsite some online)

COMMITTEE SERVICE:

Academic Policies Committee (Chair) 93-96
Faculty Senate 96, 06-09
Faculty Senate President 08-10
Chair, NCA-Higher Learning Commission Steering Committee 06
Dean's Council 03-05
Governance Task Force 03
Library Advisory Committee (Chair) 92-99
President's Faculty Budget Advisory Council 96-97
Periodical Review Committee 94
Higher Learning Commission Steering Committee
Budget Advisory Task Force (BATF) 99
Animal Care and Use Committee (vice chair) 97-08
President's Advisory Council
MSC Chapter of Sigma Xi Secretary 94
MSC Chapter of Sigma Xi Scholarship committee (Chair) 94

Council of Chairs (formerly NSM School Council) 1998-2005
Teacher Education Advisory Council (TEAC) 01-03
Retention and Advising Task Force 01
Development Council 03-05
Secondary Methods Group 01-02
Computer Advisory Committee 01
Advanced Learning Center Steering Committee (ALC) 01-02
PreMed Club Advisor 94-97
Biology Club Advisor (TriBeta Honor Society) 92-97
Spring 1997-2000 Appointed as Editorial Board Member, American Society of
Ichthyologists and Herpetologists
Student Affairs committee 90-92
General Education Assessment Committee 92-93
Graduate Role and Mission Task Force 93-94
Advisor, CAB Student Health Advisory Committee 97
Suspension and Appeals Committee 03-06
Academic Program Quality Priorities and Productivity group (APQPP) 2008-09
Academic Dishonesty Committee, Chair 2010-16
Grade Appeals Committee, Chair 2010-16
Chair, Biology Department Freshman Series Review Committee
As AVPAA, ex office on most academic committees and Assessment Committee
Student of Concern Committee 2010-16
CCHE (Colorado Commission on Higher Education) General Education Council 2010-16
Director of Graduate Studies while AVPAA
HLC Criterion 3 committee Chair, 2013 and 2018.

FACULTY SEARCH COMMITTEE PARTICIPATION:

Agriculture department faculty search 92-93
Dean, School of Natural Sciences search 93-94
Biological Sciences faculty search 93-94
Political Science faculty search 93-94
Analytical Chemist faculty search 94-95
Biological Sciences faculty search 97-98
Publicity Coordinator 03-04
Vice President for Academic Affairs 04-05
Professor of Nursing faculty search 07-08
Business Department Head search 2015
Mass Com faculty search 2016
Microbiology search committee 2017-18
Zoology search committee 2018-19
Several other search committees as AVPAA

PUBLICATIONS (following employment at CMU):

- Werman, S.D. 2008. Phylogeny and the evolution of beta-neurotoxic phospholipases A₂ (PLA₂) in the venoms of rattlesnakes, *Crotalus* and *Sistrurus* (Serpentes: Viperidae). In: The biology of the rattlesnakes. Hayes, W., et al., eds. Loma Linda University Press, Calif. Pp. 511-536.
- Werman, S. D. 2005. Hypotheses on the historical biogeography of bothropoid pitvipers and related genera of the Neotropics. Pp. 306-365 In: Ecology and evolution in the tropics: A herpetological perspective. Donnelly, M., et al. eds. University of Chicago Press, Chicago IL.
- Werman, S. D. 2001. Book review: A field guide to the amphibians and reptiles of the Maya World. By Julian C. Lee. *Copeia* 2001 (2): 580-582.
- Werman, S. D. 1999. Molecular phylogenetics and morphological evolution in Neotropical pitvipers: An evaluation of mitochondrial DNA sequence information and the comparative morphology of the cranium and palatomaxillary arch. *Kaupia* 8:113-126.
- Werman, S. D. , Crother, B. I. and M. E. White. 1999. Phylogeny of Some Middle American pitvipers based on 12S and 16S mitochondrial DNA sequence information. *Cont. Herp.* 1999(3) 14pp.
- Werman, S. D. 1997. Systematic implications of lactate dehydrogenase isozyme phenotypes in Neotropical pitvipers (Viperidae: Crotalinae). Pp. 79-88. In. *Venomous Snakes: Ecology, evolution and snakebite.* Thorpe, R. S., Wuster, W. and A. Malhotra (eds.). Symp. zool. Soc. Lond. No.70, Oxford University Press. 276 pp.
- Qaddour, J. S., Werman, S. D., and P. Misra. 1997. A singularly perturbed mathematical model of bacterial gene regulation (Lac Operon). *Proc. of I.E.E.E. Singapore Int. Symp. on Control Theory and Appl.* 1: 374-378.
- Werman, S. D., Springer, M. S. and R. J. Britten. 1996. *Nucleic Acids I: DNA-DNA Hybridization.* Pp.169-203 In *Molecular Systematics.* Second edition. Hillis, D. M., Moritz C. and B. K. Mable (eds.), Sinauer Assoc. Sunderland, MA, USA. 655 pp.
- Werman, 1993. Snakes, important reptiles of the Grand Valley. *The Leaverite News.* Grand Junction Gem and Mineral Club. 10(1): 4-5. (non-refereed)
- Werman, S. D. 1992. Phylogenetic relationships of Central and South American pitvipers of the genus *Bothrops* (sensu lato): Cladistic analyses of biochemical and anatomical characters. Pp. 21-40 In. *Biology of the Pitvipers.* Campbell, J. A. and E. D. Brodie, Jr. (eds.), Selva, Tyler, Texas. 467 pp.
- Werman, S. D. 1991. Snakes: Ancient symbols of renewal. *Newsletter Grand Valley Audubon Society.* 20(5):6-7. (non-refereed)
- Werman, S. D. 1991. Snakes: Important reptiles of western Colorado and the Grand Valley. *Newsletter Grand Valley Audubon Society.* 20(6). 6-7. (non-refereed)

Werman, S. D., Eric H. Davidson and R. J. Britten. 1990. Rapid evolution in a fraction of the *Drosophila* nuclear genome. *J. Mol. Evol.* 30:281-289.

(1982-1986, seven single authored refereed publications prior to employment at CMU)

CONFERENCE PRESENTATIONS (following employment at CMU):

1992: "The Biogeography of Meso American Pitvipers", Symposium on the Latin American Herpetofauna, American Society of Ichthyologists and Herpetologists, University of Illinois, Urban-Champaign. (**Invited speaker**)

1995: "Lactate dehydrogenase isozyme phenotypes in Neotropical Pitvipers", Symposium on Venomous Snake Biology, Zoological Society of London, London England. (**Invited speaker**)

1997: "Molecular phylogenetics and morphological evolution in Neotropical Pitvipers". Symposium on the Evolution of the Viperidae, World Congress of Herpetology, Prague, Czech Republic, (**Invited speaker**).

1999: "Phylogenetics of Middle American Pitvipers" Annual meeting of the Society of Ichthyologists and Herpetologists, Penn State University. (oral presentation)

2000: "Phylogenetic relationships of Middle and South American pitvipers based on a total evidence approach to the analysis of genetic, morphological and allozymic characters". Biology of Vipers Conference, Swedish Biodiversity Center, Marielund, Sweden. (**Invited speaker**)

2000: "Biogeography of Neotropical Pitvipers". Annual meeting of the Society of Ichthyologists and Herpetologists, La Paz, Baja California. (**Invited symposium speaker**)

2001: "Biogeography of the *Bothrops atrox* species complex". Annual meeting of the Society of Ichthyologists and Herpetologists, Indianapolis, IN. (poster presentation)

2005: "A phylogenetic perspective on the evolution of some biological properties of rattlesnake venom". Biology of the Rattlesnakes Conference, Loma Linda University, Loma Linda, CA (poster presentation).

2008: "Evolution of neurotoxic PLA2s in pitvipers" Annual meeting of the American Society of Ichthyologists and Herpetologists, Montreal, Canada (poster presentation).

2009: "Genetic analysis of neurotoxin genes in the Midget Faded Rattlesnake" Annual meeting of the American Society of Ichthyologists and Herpetologists, Portland, Oregon (poster presentation)

2017: "Aspects of the cephalic anatomy of the bushmaster (*Lachesis*) with phylogenetic considerations." Joint Meeting of Ichthyologists and Herpetologists, Austin, TX (poster presentation)

2018: "DNA sequence information of concolor toxin genes in the midget faded rattlesnake near Grand Junction, Colorado. Joint Meeting of Ichthyologists and Herpetologists, Rochester, NY (oral presentation)

2019: "A possible mechanism to protect the eyes and infrared pits during envenomation and prey seizure in some pitvipers." Biology of the Pitvipers 3 Conference. Chirichua Desert Museum and Geronimo Event Center, Rodeo NM. (poster presentation)

MISCELLANEOUS:

1990: Lead a one month research expedition to southern Costa Rica to survey and collect cloud forest amphibians and reptiles. Sponsored by Stanford University and the University of Miami

1990; Co- instructor for "Tropical Ecosystems", a two week field course in Puerto Rico, with Dr. Ed. Hurlbut,

1991: MSC Physics Seminar Series, presented a seminar titled: "Chaos in Biological Systems".

1991: Presented a one hour guest lecture on the human genome project for Dr. Gordon Gilbert's summer course titled "Science for Teachers".

1991: Presented a MSC Faculty Colloquium titled: "Tropical Rain Forests, Paradise in Peril".

1992: Presented a one hour guest lecture on "Space Medicine and Space Biology" for the Mathematics Department Space Science Course, sponsored by NASA.

1992: MSC Physics Seminar series: presented a seminar titled: "Evolution and the Second Law of Thermodynamics"

1992: Organized and established the "Center for Biophysical Modeling" at MSC with Prasanta Misra, Jihad Quador and Gordon Gilbert. (dissolved in 1998).

1993: Presented the keynote lecture on biotechnology at the Museum of Western Colorado's opening special private screening of "Jurassic Park" at the Carmike Cinemas.

1993: Presented a guest lecture on the application of Radiographic analyses to zoological specimens, to the Radiology program at MSC on the National Technology Week seminar.

1993: Invited speaker for the Uncompahgre Plateau Paleontological Society; presented a seminar titled: "Cranial Kinesis in Lizards and Snakes"

1997: Presented a "Campfire Talk" on local reptiles, at the Colorado River State Park, Island Acres for the Colorado State Parks, West Regional Office.

1997 Guest lecturer for Prasanta Misra's Advanced Physics course. Lecture title: Advances in genetics and biotechnology".

1997: Presented a Physics Department Seminar titled: "The Role of Mathematics in Biology"

1997-02: Appointed as Associate Editor, Section of Systematics and Evolutionary Genetics, for the Journal Contemporary Herpetology.

- 1999: Gave a talk on snake biology for two 7th grade classes at Orchard Mesa Middle School.
- 2000: Presented a MSC Natural Sciences and Mathematics Colloquium titled: “Medical Herpetology, Pitvipers and Snakebite”.
- 2001: Gave a talk on snakes for the MSC preschool at 29th and North Ave.
- 2001; Presented demonstrations on reptiles at for the 5th Grade Science class at Bookcliff Middle School, GJ
- 2002: Gave talks on reptiles to kindergarten students at Thunder Mt. Elementary School and one on snakes to a similar class at Wingate Elementary School.
- 2002: Participated in the District 51 Career Opportunity Fair and presented information on MSC science programs.
- 2004: Herpetologist Consultant for the National Raisin Company, Fresno, CA.
- 2005: Gave eight separate 30 minute talks to K-1 and 3rd graders on reptile and amphibian biology at Wingate Elementary School
- 2005: Invited to participate and present at the Wingate Elementary 3rd grade “Authors’ Forum Panel” to explain and discuss the nature of science writing and publishing.
- 2005: Gave a 30 minute talk on biology related jobs to the 5th grade Talented and Gifted Students at Wingate Elementary School, followed by two 45 minute talks on reptiles to two 2nd grade classes
- 2006: Gave a one hour talk on Desert Adaptations in Reptiles to a 4th grade class at Wingate Elementary School.
- 2007: Science Fair Judge 4th grade, Wingate Elementary School Science Fair.
- 2007: Guest lecturer on DNA and protein sequencing in T. rex for Tony Kovschak’s Geology 106 Paleontology course.
- 2006- 2018: Guest lecturer on Desert Reptiles for Stephanie Matlock-Cooley’s Desert Ecology Course. Human Osteology course and Dr. Hanson’s Herpetology course.

AWARDS/GRANTS:

- 1994 Mesa State Foundation, Faculty Enrichment Award, (with Walter Kelley): \$1,000
- 1994 Nominated for MSC Distinguished Faculty Award
- 1997 MSC Professional Development Award, \$800

1998 MSC Foundation Faculty Enrichment Award, \$1,000

1999 MSC Professional Development Award \$800 and Office of State Colleges Faculty Development Award \$1,500.

2001 Lathrup Foundation Award (CMU Foundation): \$8,000 for research on Pitvipers

2007 -08, -09, -16, -17, -18: Faculty Professional Development Award \$1,080

2008 Faculty Professional Development Award \$1,000

2009 National Science Foundation S-STEM proposal to fund science scholars, \$550,000 Dr. Margot Beckett coPI, (not awarded)

PROFESSIONAL SOCIETY MEMBERSHIP AND PARTICIPATION:

American Association for the Advancement of Science
American Society of Ichthyologists and Herpetologists
Society for the Study of Amphibians and Reptiles
Willi Henning Society (Honorary member)
Herpetologist's League
Society for Systematic Biology
Sigma Xi (Scientific Research Society)
International Society on Toxinology
Biogeography Society
Wilderness Medicine

STUDENT RESEARCH PARTICIPATION:

(Biology 387 and 487)

Non-radioactive DNA melting curve determination technique
Wendy Filner

Population variation and genetics of tree frogs and red spotted toads with allozymes
Michael Todd

Genetic of hybrid zones between salamanders of the Pacific northwest with DNA sequence and RFLP analyses.
Shay West, Jackie Castle, Nate Bunch and Olivia Wytcherley, Chrystal Shurtleff

DNA sequence analyses in concolor neurotoxin genes
Mark Kowal, Jacki Ripley, Caroline Moravek, Rebecca Bryant, Nicole Castle, Elizabeth Wigdahl

Dale B. Call, M.D.

Instructor of Biological Sciences
Colorado Mesa University
Grand Junction, Colorado and
Montrose, Colorado
dcall@coloradomesa.edu

Education

Medical Doctor, University of Maryland School of Medicine, 1978
Bachelor of Science, Brigham Young University

Experience and Certifications

The American Fertility Society, 1992
Fellow, American College of Obstetricians and Gynecologists, 1991
Clinical & Histopathologic Overview of Obstetrics and Gynecology, St Barnabas Medical Center, 1985
Resident and Chief Resident in OB/Gyn, Sinai Hospital of Baltimore, 1983
Intern and Resident in Pediatrics, University of Maryland Hospital, 1980

Courses Taught

BIOL 409, Gross and Developmental Human Anatomy
BIOL 409L, Gross & Developmental Human Anatomy Lab
BIOL 241, Pathophysiology
BIOL 210, Human Anatomy & Physiology II
BIOL 210L, Human & Physiology II Lab
BIOL 209, Human Anatomy & Physiology I
BIOL 209L, Human Anatomy & Physiology I Lab

Evidence of Continuous Improvement

Montrose Memorial Hospital Continuing Medical Education, 2015
American Institute of Medical Education, 2015
Parenting Safe Children Professional In-Service, 2015
UAB School of Medicine, 2014
Student Payroll Supervisor Training, UMC, 2014
Hope West Advanced Bereavement Training, 2014

Montrose Memorial Hospital Continuing Medical Education, 2012

Overcoming Pornography: Helps for Wives and Families, 2011

Montrose Memorial Hospital Continuing Medical Education, 2011

American Institute of Medical Education, 2011

Montrose Memorial Hospital Continuing Medical Education, 2010

Montrose Memorial Hospital Continuing Medical Education, 2009

Montrose Memorial Hospital Continuing Medical Education, 2008

Professional Memberships

Colorado Medical Society

American Fertility Society

Society of Laproendoscopic Surgeons

Honors and Awards

Altrusa International, Inc of Montrose, Colorado - Apple Teacher Award Recipient, 2011

Tracy L. Cyr, Ph.D.

Instructor, Department of Biological Sciences
Colorado Mesa University
Grand Junction, Colorado

Education:

Postdoctoral Research Scientist, Animal Parasitic Diseases Laboratory, USDA, ARS, Beltsville, MD, 2002 – 2004

Postdoctoral Research Fellow, Dept. of Veterinary Pathobiology, School of Vet. Med, University of Missouri, 2000

Postdoctoral Research Fellow, Dept. of Molecular Microbiology & Immunology, School of Med. University of Missouri, 1999 – 2000

Ph.D, Entomology, University of Missouri, 1999 MS, Entomology, Washington State University, 1993

BS, Biology, University of California at Riverside, 1989

AS , Biology, Crafton Hills College, Yucaipa, CA (as Tracy L. Elliott), 1977

Teaching:

Courses Taught At CMU

Biol 210: Human Anatomy & Physiology II

Biol 210L: Human Anatomy & Physiology II Lab

Biol 102: Plant & Animal Biodiversity

Biol 102L: Plant & Animal Biodiversity Lab

Biol. 431: Animal Parasitology

Biol 431L Animal Parasitology Lab

Biol 499: Student Internship

Biol 106: Principles of Animal Biology

Biol. 106L Principles of Animal Biology Lab

Biol 108: Diversity of Organisms

Biol 108L: Diversity of Organisms Lab

Biol 209L: Human Anatomy & Physiology I

Courses Taught Elsewhere

As Visiting Professor, Ross School of Veterinary Medicine: 2nd Semester Veterinary Parasitology (lecture & lab)

As Clinical Assistant Professor, Texas A&M Univ. School of Veterinary Medicine & Biomedical Sciences: 2nd year

Veterinary Parasitology; 4th year Veterinary Parasitology Rotation; VTPB 487: Biomedical Parasitology (alternating course coordinator for upper level undergrad. elective)

As Assistant Professor, Ohio Northern University: Human Anatomy & Histology lect.& lab (course coordinator); Biology 1, 2, & 3 (general biol. core for undergrads); General Entomology

As Adjunct Faculty, William Woods University: majors and non-majors general biology

As Graduate Student/TA, University of Missouri: Medical & Veterinary Entomology (lect. & Labs); Molecular Laboratory Techniques (as a part of the medical rotation for Infectious Disease Postdoctoral Research Medical Fellows)

As a Graduate Student/TA, Washington State University: Medical/Veterinary Entomology Laboratory;

As a Guest Lecturer, University of Idaho: Criminal Investigation (undergrad course)

Evidence of Continuous Improvement

2005 to 2011 During my employment as faculty member at Texas A&M University, I had the opportunity to take part in a number of teaching workshops/ academies/ forums sponsored by the TAMU Center for Teaching Excellence, University Writing Center, and CVM Computing Services including: designing a teaching portfolio, faculty forum on undergraduate research, "publish or flourish" workshop, designing courses for significant learning, syllabus design, faculty teaching styles lecture series, "lecturing well", assessment/feedback design, grading rubric workshop, and "why students plagiarize".

For three consecutive years, I have taken part in the "Writing Assessment Project" which is a university-wide project that investigates student writing abilities under the direction of the TAMU Office of Institutional Assessment and the University Writing Center.

I have attended courses designed by Employee & Organizational Development including: Calibrated Peer Review, WebCT Vista, Advanced Power Point, adobe Dreamweaver essentials CS3, CS5, Adobe Flash CS3 essentials, HTML-XHTML essentials, and Cascading Style Sheets.

Innovative Materials/Activities

Assisted with the creation of the Custom Lab Manual for Biol. 210L, Fall 2019

Supervision of Student Research/Project(s)

Sponsored Summer Student Internship, Summer 2016: Footprints Animal Hospital, Research Report: "Canine Enuclation"

Scholarship and Creative Work:

Journal Articles

Luksovsky, J., T. M. Craig, G. M. Bingham, T. Cyr, and D. Forrest. 2012. Determining treatment to control two multidrug-resistant parasites on a Texas horse farm. *J. Eq. Vet. Sci.* 33(2): 115-119.

White, S. L., M. P. Ward, C. M. Budke, T. Cyr, and R. Bueno Jr. 2009. A comparison of gravid and under-house CO₂-baited CDC light traps for mosquito species of public health importance in Houston, Texas. *J. Med. Entomol.* 46(6): 1494-1497.

Flores, V., T. Cyr, K. Snowden, S. Ferrell. 2006. Lurking in the Wings: Avian hemoparasites and their insect vectors at the Fort Worth Zoo. *Proc. Summer Vet. Student Res. Fellow. Conf.* Aug.:56-61.

Carroll, J. F., V. B. Solberg, and T. L. Cyr. 2006. Development of a bioassay for evaluating tick (Acari: Ixodidae) attractants in the field. *Proc. Entomol. Soc. Wash.* 108: 82-91.

Carroll, J. F., and T. L. Cyr. 2005. A note on the densities of *Ixodes scapularis* (Acari: Ixodidae) and white-tailed deer on the campus of the National Institute of Standards and Technology, Maryland, USA. *Proc. Entomol. Soc. Wash.* 107(4): 973-976.

Cyr, T. L., M.L. Jenkins, R. D. Hall, E. J. Masters, and G. A. McDonald. 2005. Improving the Specificity of 16S-rDNA-Based Polymerase Chain Reaction for Detecting *Borrelia burgdorferi* sensu lato-Causative Agents of Human Lyme Disease. *Journal of Applied Microbiology.* 98: 962-970.

Cyr, T. L., J. F. Carroll, M. L. Jenkins. The effects of experimental infection of dairy calves with *Borrelia burgdorferi* by exposure to field-collected deer ticks and the possible role of cattle in maintaining an enzootic cycle of transmission of Lyme disease. (in prep.)

Spratt, M. L., T. L. Cyr, T. Lucas, , A. Littlejohn, K. Miles, R. Palow, and , G. A. McDonald. *Francisella tularensis* in Missouri ticks. (in prep.)

Roland, W. E., E. D. Everett, T. L. Cyr, S. Z. Hasan , C. B. Dommaraju, and G. A. McDonald. 1998. *Ehrlichia chaffeensis* in Missouri ticks. *Am. J. Trop. Med. Hyg.* 59: 641-643.

Byrne, A. L., M. A. Camann, T. L. Cyr, E. P. Catts, and K. E. Espelie. 1995. Forensic implications of biochemical differences among geographic populations of the black blow fly, *Phormia regina* (Meigen). *J. Forensic Sci.* 40: 372-377.

Meyer, J. A., B. A. Mullens, T. L. Cyr, and C. Stokes. 1990. Parasites for filth fly control on dairies. *Calif. Agric.* 44: 13-15.

Meyer, J. A., B. A. Mullens, T. L. Cyr, and C. Stokes. 1990. Commercial and naturally occurring fly parasitoids (Hymenoptera: Pteromalidae) as biological control agents of stable flies and house flies (Diptera: Muscidae) on California dairies. *J. Econ. Entomol.* 83: 799-806.

Meyer, J. A., T. Cyr, J. D. Mandeville, and W. D. McKeen. 1988. Evaluation of Larvadex 5SC for controlling development of *Fannia* spp. *Insecticide and Acaricide Tests.* 13: 404.

Mullens, B. A., J. A. Meyer, and T. L. Cyr. 1987. Infectivity of insect-parasitic nematodes (Rhabditida: Steinernematidae, Heterorhabditidae) for larvae of some manure-breeding flies (Diptera: Muscidae). *Environ. Entomol.* 16: 769-773.

Conference Presentations

Cyr, T.L. Continued investigation of hemorrhagic disease virus vectors on Texas ranches. Poster presented at the 58th Annual Meeting of the Entomological Society of America, San Diego, CA. Dec. 2010.

Cyr, T.L. "What's killing our deer?" 10 min talk presented to the 55th Annual Meeting of the American Association of Veterinary Parasitologists, Atlanta, GA July 2010.

Cyr, T.L., D. Davis, W. Mwangi, C. Seabury, D. Rollins. A survey of potential biting fly vectors (*Culicoides* spp.) of epizootic hemorrhagic disease virus in Texas. Poster presented at the 57th Annual Meeting of the Entomological Society of America, Indianapolis, IN, Nov. 2009.

Cyr, T.L., D. Davis, W. Mwangi, C. Seabury, D. Rollins. "What's killing our deer?" Investigation of hemorrhagic disease virus vectors on Texas ranches. Poster presented at the 56th Annual Meeting of the Entomological Society of America, Reno, NV Nov. 2008.

- Cyr, T.L., Chalaire, K, V. Flores, K. Snowden, S. Ferrell. Still lurking in the wings: A survey of insect vectors of avian hemoparasites at the Fort Worth Zoo (or what happens to data when Mother Nature throws you a curve). Poster presented at the 55th Annual Meeting of the Entomological Society of America, San Diego, CA, Dec. 2007.
- Snowden, K., T. Cyr, V. Flores & S. Ferrell. Avian hemoprotozoa: Avian fatalities and vector surveillance in a zoo. 15 min. talk presented to the 51st Annual Meeting of the AAVP, Washington DC, July, 2007.
- Cyr, T.L., V. Flores, K. Snowden, S. Ferrell. Lurking in the wings: Avian hemoparasites and insect vectors at the Fort Worth Zoo. Poster presented to the 54th Annual Meeting of the Entomological Society of America, Indianapolis, IN. Dec. 2006.
- Cyr, T. L., C. O'Brien, and J. F. Carroll. Experimental infection of dairy calves with *Borrelia burgdorferi* by exposure to field- collected *Ixodes scapularis* ticks. Poster presented to the 51st Annual Meeting of the Entomological Society of America, Cincinnati, Ohio, October, 2003.
- Cyr, T. L., C. O'Brien, and J. F. Carroll. Experimental infection of dairy calves with *Borrelia burgdorferi* by exposure to field collected ixodid ticks. Short talk presented to the 19th conference of the World Association for the Advancement of Veterinary Parasitology, New Orleans, Louisiana, August, 2003.
- Cyr, T. L. The effects of experimental infection of dairy calves with *Borrelia burgdorferi* by exposure to field-collected deer ticks and the possible role of cattle in maintaining an enzootic cycle of transmission of Lyme disease. Short talk presented to the 47th Annual Livestock Insect Workers Conference, Atlantic Beach, North Carolina, June, 2003.
- Cyr, T. L. Using PCR to Detect *Borrelia burgdorferi* in Cattle. Poster presented to the 50th Annual Meeting of the Entomological Society of America, Fort Lauderdale, Florida, November 2002.
- Spratt, M. L., R. Palow, T. L. Cyr, and G. A. McDonald. *Francisella tularensis* identified by PCR in Missouri ticks. Poster presented to the American Society for Microbiology, Chicago, Ill, June 1999.
- Cyr, T. L., R. D. Hall, and G. A. McDonald. Using molecular techniques to target Lyme disease in Missouri. Poster presented to the Entomological Society of America, Annual Meeting, Las Vegas, Nevada, December 1998.
- Cyr, T. L., R. D. Hall, and G. A. McDonald. Identification of a *Borrelia* sp. present in Missouri ticks and patient samples using DNA sequencing. Poster presented to the American Society for Microbiology, 98th General Meeting, Atlanta, Georgia, May 1998.
- Cyr, T. L., R. D. Hall, and G. A. McDonald. The identification of *Borrelia* sp. present in Missouri ticks and patient samples using PCR. Poster presented to the Entomological Society of America, Annual Meeting, Nashville, Tennessee, December 1997.
- Cyr, T. L., R. D. Hall, E. J. Masters, C. C. Graumann, and G. A. McDonald. The identification of a previously unrecognized *Borrelia* sp. in non-Ixodes ticks and patient samples from Missouri. Short talk presented in the "Late-breaking News" session of the American Society of Tropical Medicine and Hygiene, Annual Meeting, Baltimore, Maryland, December 1996.

Cyr, T. L., R. D. Hall, E. J. Masters, C. C. Graumann, and G. A. McDonald. The identification of a previously unrecognized *Borrelia* sp. in non-Ixodes ticks and patient samples from Missouri. Poster presented to the Entomological Society of America, Annual Meeting, Louisville, Kentucky, December 1996.

Cyr, T. L., R. D. Hall, E. J. Masters, C. C. Graumann, and G. A. McDonald. The identification of *Borrelia* sp. by polymerase chain reaction from ticks collected in Missouri. Poster presented to the Entomological Society of America, Annual Meeting, Las Vegas, Nevada, December 1995.

Cyr, T. L., R. D. Hall, E. J. Masters, C. C. Graumann, and G. A. McDonald. The identification of *Borrelia* sp. by polymerase chain reaction from ticks collected in Missouri. Short talk presented to the Entomological Society of America, Annual Meeting, Dallas, Texas, December 1994.

Cyr, T. L., and E. P. Catts. Forensic implications of biological differences among geographic races of *Phormia regina* (Diptera: Calliphoridae). Short talk presented to the Entomological Society of America, Pacific Branch Meeting, Kona, Hawaii, June 1992.

Cyr, T. L., and E. P. Catts. Forensic implications of biological differences among geographic races of *Phormia regina* (Diptera: Calliphoridae). Short talk presented to the Entomological Society of America, Annual Meeting, Baltimore, Maryland, December 1992.

Publications

Unit 4: The Urinary & Reproductive Systems IN: Anatomy & Physiology II Laboratory Manual. Custom edition for CMU Dept. of Biol.

Grants

Spring 2014: Desert Ecosystem Analysis & Restoration: \$1,000.00

Unpublished Research

Cyr, T. L., and E. Rechel. "A non-invasive survey of arthropod and gastro-intestinal parasites of white-tailed prairie dogs, *Cynomys leucurus*, living near Grand Junction, Colorado."

Cyr, T. L., and S. Ott. "What's Killing Our Deer?" Investigation of hemorrhagic disease virus vectors on Texas ranches. (culmination of a 3 yr survey of biting fly vectors (*Culicoides* spp.) on free ranging and captive reared white-tailed deer on west Texas ranches.)

Cyr, T. L., J. F. Carroll, and M. L. Jenkins. Experimental infection of dairy calves with *Borrelia burgdorferi* by exposure to field- collected *Ixodes scapularis* ticks. (Report of a study conducted at USDA, BARC, Beltsville, Md. (2002-2003)

Professional Memberships

Sigma Xi

Entomological Society of America

Service:

Subcommittee to establish proposed BIOL 108/108L

2013, 2014, 2015: Science Fair Judge

FY 2015 & 2016: Judge for CMU/WCCC Student Showcase

Professional Experience:

Visiting Professor, Ross School of Veterinary Medicine Jan. 2012 – Aug. 2012

Clinical Assistant Professor, Texas A&M Univ. School of Veterinary Medicine & Biomedical Sciences March 2005 – Dec. 2011

Postdoctoral Research Scientist, Animal Parasitic Diseases Laboratory, USDA, ARS, Beltsville, MD. July 2002 – Nov. 2004

Assistant Professor, Ohio Northern University, Ada, Ohio. Sept. 2000 – June 2002

Adjunct Faculty, William Woods University, Fulton, Mo. Jan. 1998 – June 2000

Renee L. Good, Ph.D.

181 Arches Drive
Fruita, CO, 81521
Phone: (720) 984-5785
Email: goodrl@outlook.com

SPECIAL QUALIFICATIONS

- Experience teaching undergraduate students in a human cadaver laboratory and non-lecture style instruction to graduate students
- Recently completed coursework focusing on online teaching
- Significant experience writing and preparing manuscripts for publication
- Experience preparing and delivering symposium-style lectures for broad audiences
- Extensive research background and expertise in Neurotoxicology with special emphasis in behavioral genetics and drugs of abuse, molecular and cellular toxicology, and metabolism
- Strong analytical and problem-solving skills
- Excellent oral and written communication skills
- Experienced with Blackboard

EDUCATION

University of Colorado Denver, Anschutz Medical Campus, Aurora, CO

Doctor of Philosophy, Toxicology, Molecular Toxicology and Environmental Health Sciences Program, May 2011

Institute for Behavioral Genetics, University of Colorado, Boulder, CO

Institute for Behavioral Genetics Graduate Training and Interdisciplinary Certificate Program, May 2009

Washington State University, Pullman, WA

Bachelor of Science, Psychology, May 2004

Washington State University, Pullman, WA

Bachelor of Science, Neuroscience, May 2003

CONTINUING EDUCATION

UNSW Australia (The University of New South Wales)

Learning to Teach Online, Certificate Achieved via Coursera.org, April 2017

Stanford University Online

O.P.E.N. Creating Effective Online and Blended Courses, March 2017

University of Michigan

Instructional Methods in Health Professions Education via Coursera.org, March 2017

VOLUNTEER SERVICE

Sept. 2016 - **Art Heritage Program, Mesa County School District 51, Colorado**

present *Instructor*

Deliver background information about artists and their techniques to elementary school students. Demonstrate artistic techniques and guide classrooms through diverse art projects.

Aug. 2016 - **Girl Scouts of Colorado**

present *Girl Scout Leader*

Provide leadership to Daisy and Brownie girl scouts while guiding them through their respective programs. Responsible for troop finances, fundraising and philanthropic activities.

Aug. 2015 - **Boy Scouts of America**

present *Cub Scout Leader*

Responsible for delivering the Tiger and Wolf cub scout programs. Member of the Cub Scout Pack 323 Leaders Committee. Actively involved in decisions, event planning and orchestration of all Pack events.

PROFESSIONAL EXPERIENCE

June 2005 - **University of Colorado Denver, Anschutz Medical Campus, Aurora, CO**

Jan. 2011 *Doctoral Candidate, Department of Pharmaceutical Sciences, Toxicology Program*

Doctoral project determined the independent long-term effects of low dose and high-dose binge methamphetamine (METH) pretreatments. Utilized both adolescent and adult mice of three genetically inbred mouse strains. Experiments were designed to test the hypothesis that the protective effects to METH toxicity witnessed during adolescence allow for greater susceptibility to addiction formation in adulthood. Strong emphasis was given to genetically derived METH metabolism differences, neurotransmitter metabolism (HPLC) and open-field behavioral responses to a METH challenge forty days following METH pretreatment. Trained and provided technical support to laboratory personnel and students in multiple techniques and method development. Strong laboratory experience including designing, managing and collaborating in multiple research projects simultaneously. Three years' experience providing course support to School of Pharmacy students and faculty as a Graduate Student Teaching Assistant for multiple courses, including Biochemistry and Physiology.

June 2006 - **University of Colorado Denver, Anschutz Medical Campus, Aurora, CO &**

June 2009 **Institute for Behavioral Genetics, University of Colorado, Boulder, CO**

Doctoral Candidate, Department of Pharmaceutical Sciences, Toxicology Program

Designed and performed experiments to determine the effects of alcohol on Long-Term Potentiation (LTP) and Long-Term Depression (LTD) formation within the ILS and ISS mouse strains. Utilized both RT-PCR, as well as Beckman-Coulter multiplex RT-PCR, to determine the effects of alcohol on gene expression changes within striatal tissue. Provided training on the multiplex RT-PCR and technical leadership to students and laboratory personnel in multiple laboratories.

May 2005 - **University of Colorado Denver, Anschutz Medical Campus, Aurora, CO**

Sept. 2005 *Graduate Research Internship*

Using C57BL/6 and DBA/2 mouse strains, compared the behavioral effects of methamphetamine on conditioned place preference. Assessed the effects of methamphetamine on glutathione concentrations within the striatum and prefrontal cortex of the B6 and D2 genotypes.

Jan. 2005- **University of Colorado Denver, Anschutz Medical Campus, Aurora, CO**

May 2005 *Graduate Research Internship*

Investigated the involvement of the ERK signaling cascades in mouse lung tumorigenesis. Designed and performed protein experiments to determine interactions over a year-long time course.

Aug. 2004- **University of Colorado Denver, Anschutz Medical Campus, Aurora, CO**

Dec. 2004 *Graduate Research Internship*

Designed and performed studies to determine toxic effects of α -tocopherol succinate within prostate and colon cancer cell lines, both normal and immortalized.

May 2004- **Washington State University, Pullman, WA**

Aug. 2004 *Undergraduate Student Fellowship*

Developed HPLC assay to simultaneously determine concentrations of α -tocopherol, α -tocopherol succinate and α -tocopherol acetate. Determined which vitamin E compounds were present, and their concentrations within commercially available nutraceuticals.

Nov. 2003- **Washington State University, Pullman, WA**

Aug. 2004 *Professional Research Assistant*

Responsible for assessment of dietary vitamin E availability within human mitochondrial fractions of blood platelets. Samples were collected during a clinical study for the effects of vitamin E on mitochondrial oxidative stress, and continued vitamin E studies from 2003. Performed both rat bile-duct and rat jugular vein cannulations for pharmacokinetic studies. Investigated the effects of vitamin E on oxidative stress and its anti-cancer properties in numerous cell lines. Provided technical leadership and training to students and laboratory personnel in multiple experimental techniques, method development and scientific writing. Strong team-based laboratory experience including designing, managing and collaborating in multiple research projects simultaneously.

May 2003- **Washington State University, Pullman, WA**

Nov. 2003 *Professional Research Assistant*

Involved in three independent projects to determine the bioavailability of vitamin E within rat and mouse species, the ability of dietary vitamin E to reduce cardiac oxidative stress produced by doxorubicin, and the reduction of rotenone-induced oxidative stress via vitamin E pretreatment. Extracted vitamin E and its derivatives from mitochondrial fractions, mouse and rat tissues, and cell lines to determine concentrations of α -tocopherol, α -tocopherol succinate and α -tocopherol succinate-PEG compounds via HPLC. Responsible for all laboratory operations including laboratory equipment troubleshooting and repair and maintenance.

Jan. 2002- **Washington State University, Pullman, WA**

May 2002 *Undergraduate Research Internship*

Investigated the effects of oestradiol and gonadotrophin-releasing hormone on the estrous cycle of the ewe. Studies were designed to further determine the involvement of the A15 dopaminergic neurons on seasonal breeding cycles.

Aug 2002 – **Washington State University, Pullman, WA**

May 2003 *Student Teaching Assistant*

Provided instruction to students in the human cadaver laboratory for two semesters. Demonstrated all curriculum requirements (familiarity with individual cadavers, physical differences between various dissections) to students and helped prepare them for assessments.

RESEARCH FELLOWSHIP AWARDS

Predocctoral Fellowship (T32 DA017637-05) NIH/ National Institute for Drug Abuse (NIDA). PI Dr. Allan C. Collins, \$21,772 annually from 4/1/2007 to 3/31/2010

Summer Undergraduate Research Fellowship, Washington State University (2004) \$2500, 6/1/2004 to 9/1/2004

SCHOLARLY AWARDS

Graduate Student Travel Award. 22rd Annual Mountain West Society of Toxicology Meeting (2004)

Graduate Student Travel Award. 25th Annual Meeting of the Mountain West Society of Toxicology, Breckenridge, CO (2007)

Second Place Poster Platform. 25th Annual Mountain West Society of Toxicology Meeting (2007)

Graduate Student Travel Award. 47th Annual Meeting of the Society of Toxicology Student Travel Award (2008)

REFEREED PUBLICATIONS

Good RL, Liang LP, Patel M, Radcliffe RA. Dopaminergic effects of methamphetamine are dependent on strain and age. *Neurotoxicology*. 2011;32(6):751-759.

Good RL, Radcliffe RA. Methamphetamine-induced locomotor changes are dependent on age, dose and genotype, *Pharmacol Biochem Behav*. 2011;98(1):101-111.

Remsberg CM, **Good RL**, Davies NM. Ingredient consistency of commercially available polyphenol and tocopherol nutraceuticals. *Pharmaceutics*. 2010;2(1), 50-60.

Good RL, Roupe KA, Fukuda C, Clifton GD, Fariss MW, Davies NM. Direct high-performance liquid chromatographic analysis of D-tocopheryl acid succinate and derivatives. *J Pharm Biomed Anal*. 2005;39(1-2):33-38.

Teng XW, Davies NM, Fukuda C, **Good RL**, Fariss MW. Pharmacokinetics and tissue distribution of d-alpha-tocopheryl succinate formulations following intravenous administration in the rat. *Biopharm Drug Dispos*. 2005;26(5):195-203.

Davies NM, **Good RL**, Roupe KA, Yáñez JA. Cyclooxygenase-3: axiom, dogma, anomaly, enigma or splice error?--Not as easy as 1, 2, 3. *J Pharm Pharm Sci*. 2004;7(2):217-226.

AMY B. KORNKVEN

5462 Kannah Creek Road

Whitewater, CO 81527

970/241-3371

920/342-9956

kornkven@tds.net

EDUCATION

UNIVERSITY OF WISCONSIN-MADISON: Madison, WI

- *Bachelor of Science-Education* August 1987 Major: Botany

UNIVERSITY OF OKLAHOMA-NORMAN: Norman, OK

- *PhD – Doctoral Degree in Botany* May 1997
- Dissertation: Molecular Systematics of *Artemisia* section *Tridentatae*

PROFESSIONAL EXPERIENCE

SUBSTITUTE TEACHER: Mesa County School District 51, Grand Junction, CO

- Fall 2013 - Current

MOLECULAR SYSTEMATIC RESEARCHER: UW-Milwaukee, Milwaukee, WI

- 1996 - 1997
- Extraction and purification of DNA
- DNA Sequencing and AFLP fingerprinting

PLANT HERBARIUM – ASSISTANT CURATOR: University of Oklahoma, Norman, OK

- 1994-1996
- Plant specimen management: organized and filed specimens, prepared specimens for loans to other institutions, mounted and labeled new specimens.

TEACHING ASSISTANT – INTRODUCTION TO BIOLOGY LABORATORY: University of Oklahoma, Norman, OK

- 1991-1993
- Taught Biology laboratory course
- Responsible for laboratory preparation and management

TEACHING LICENSES

COLORADO TEACHING LICENSE

- License # 11061 3 year Substitute Authorization 6/27/2011 – 6/27/2014
- License#98154 Teacher License-Science Education (7-12) 12/04/2013 – 12/04/2016

PROFESSIONAL REFERENCES

- Linda E. Watson, Professor
Oklahoma State University, Department of Botany
301 Physical Sciences
Stillwater, OK 74078
405-744-5559 linda.watson10@okstate.edu
- Wayne J. Elisens
Professor/Curator of the Robert Bebb Herbarium
George Lynn Cross Hall, Rm. 208
770 Van Vleet Oval
Norman, OK 73019
405-325-5923 Elisens@Ou.edu
- Allan Nelson, Professor, Biological Sciences
Tarleton State University
Science Building, Rm. 315
Stephenville, TX 76402
254-968-9158 nelson@tarleton.edu

PUBLICATIONS

Molecular systematics of *Artemisia* section *Tridentatae* (Asteraceae). 1997. PhD University of Oklahoma.

Kornkven, Amy B.; Watson, Linda E.; Estes, James R. 1998. Phylogenetic analysis of *Artemisia* section *Tridentatae* (Asteraceae) based on sequences from the internal transcribed spacers (ITS) of nuclear ribosomal DNA. *American Journal of Botany*. 85(2): 1787-1795. [42433]

Kornkven, Amy B.; Watson, Linda E.; Estes, James R. 1999. Molecular phylogeny of *Artemisia* section *Tridentatae* (Asteraceae) based on chloroplast DNA restriction site variation. *Systematic Botany*. 24(1): 69-84. [42432]

Morphometric and Genetic Variation in *Eriocaulon koernickianum* Van Heurck & Muller-Argoviensis (Eriocaulaceae): a Disjunct Species of the Southeastern United States Linda E. Watson, Amy B. Kornkven, Carter R. Miller, James R. Allison, Newell B. McCarty, and Matthew M. Unwin (pg. 416-426)

Conservation Biology of a Rare Plant Species, *Eriocaulon kornkickianum* (Eriocaulaceae) Linda E. Watson, Gordon E. Uno, Newell A. McCarty, Amy B. Kornkven. *American Journal of Botany – AMER J BOT* 01/1994; 81(8).

Watson, Linda E., T. M. Evans, Matthew M. Unwin, and Amy B. Kornkven. 2001. Origin and Diversification of Tribe Anthemideae (Asteraceae), based on molecular phylogenies of *ndhF* and ITS. Annual Meeting of the Botanical Society of America/American Society of Plant Taxonomists. Albuquerque, New Mexico. August 2001.

Stephanie Jo Matlock
Department of Biological Sciences
Colorado Mesa University
Grand Junction, Colorado

Education:

Master of Science, Biology, Montana State University-Bozeman, 1993
Bachelor of Arts, Biology, University of Colorado-Boulder, 1988
Bachelor of Arts, Anthropology, University of Colorado-Boulder, 1988

Teaching:

BIOL 101 General Human Biology
BIOL 101L General Human Biology Lab
BIOL 102 General Organismal Biology
BIOL 102L General Organismal Biology Lab
BIOL 105 Attributes of Living Systems
BIOL 105L Attributes of Living Systems Lab
BIOL 209 Human Anatomy and Physiology
BIOL 209 Online Human Anatomy and Physiology
BIOL 209L Human Anatomy and Physiology Lab
BIOL 211 Online Ecosystem Biology
BIOL 241 Online Pathophysiology
BIOL 336 Fish Biology
BIOL 396 Topics: Small Mammal Biology
BIOL 396 Topics: Forensic Anthropology and Osteology
BIOL 408 Desert Ecology
BIOL 408 Online Desert Ecology
BIOL 410 Human Osteology
BIOL 410L Human Osteology Lab
BIOL 418 Wildlife Management
BIOL 418 Online Wildlife Biology
BIOL 418L Wildlife Field Techniques
BIOL 493 Lab Practicum
BIOL 495 Independent Study (several sections, various topics)
BIOL 496 Topics: Primate Biology
BIOL 499 Internships (several sections, various topics)
SUPP 101/UNIV 101 Introduction to Higher Education
FLAV 496 Topics: Immigration Studies
ESSL 200 Maverick Milestone: Science and Journalism

Evidence of Continuous Improvement:

Quality Matters Workshop August
D2L Workshop August, September
McGraw Hill Conference on Online Teaching March

Innovative Materials/Activities:

Incorporation of Power Point presentations for all classes

Letter Writing Activity for 101 Biology: wrote letters to entities on Biological topics and received responses

Curriculum Vitae Workshop for Wildlife Biology (418) students

Mock Public Meeting for Wildlife Biology (418) Students

Learn Smart and Connect for Online Hel

My Own You Tube Channel with Mini Lectures.

Mock Crime Scene and Analysis for my Human Osteology Class

Supervision of Student Research/Project(s):

Fall Semester 2011: Internships with 3 students. All worked with Colorado Division of Wildlife.

Students worked with Dick Antonio in processing animals brought to check station, learned CWD techniques, among others; presented reports to me about the work.

Fall Semester 2011: Independent Study with 1 student. Student cleaned all real human bone material in lab, researched mule deer genetics and included a report on her findings, and prepared documents for Osteology class.

Fall Semester 2007: Internship with 1 student. Student worked with John Toolen at the Colorado Division of Wildlife, Field Assistant for sage grouse habitat plan. Presented a report to me.

Spring Semester 2006: Internship with 1 student. Student worked with Dave Moreno from the APHIS Wildlife Services. Field work for coyote removal, kit fox habitat, and bird removal at the airport. Presented report of work.

Spring Semester 2004: Independent Study with 1 student. Student prepared collection of duck wings. Labeling and identification of ducks were taught to student, and she reported her project at the end of the semester.

Scholarship and Creative Work, 2003-Present:Journal Articles

"Deer mouse Movements in Periodomestic and Sylvan Settings in relation to Sin Nombre virus Antibody Prevalence" by Richard J. Douglass, William J. Semmens, Stephanie Jo Matlock-Cooley and Amy J. Kuenzi. Journal of Wildlife Diseases. Oct. 2006 (Vol. 42, No. 4).

Book Reviews

Review of "Fundamentals of Forensic Anthropology" by Linda Klepinger. Published in The Applied Anthropologist Journal, Spring 2008: Vol. 28: Number 1:135-136.

Conference Presentation

"Healthy Eating and Techniques to Reduce Stress" Keynote Speaker for Celebrate Girls Conference. CMU, Grand Junction, Colorado. April, 2005.

Performances

"Deermice, the real animal and Hantavirus dangers". Intellectures Discussion Group. Fruita , Colorado. Feb. 20, 2005.

Service:

CMU

15 Passenger Van Safety Lesson-Certificate of Completion.

Guest Lecture for Fish and Wildlife Club on Wildlife and the Mexican Border. March 2014

Search Committee for Academic Advisor Mar-April 2013.

Guest Lecture on Climate Change in Alaska and the effects on wildlife to the ENVIS/GEOL 394 Course. October 2013.

Gave Faculty Colloquium presentation on my faculty fellowship in Alaska. 2013

Guest Lecturer for the CMU Biology Club-How to get a job with the federal government. October 2013.

Training Session for Safety and Shooters on Campus by Dr. Nicoletti. April. 2012

Guest Lecturer for the CMU Native American Council-Health Concerns for Native American Tribes and Diabetes. April 2011

Panelist for a discussion on graduate school for the Tri-Beta Biology Club. December 2006

Lecture for the CMU Outdoor Program. "African Safari and Mammals of East Africa" CMU. April 2006

Regional

Judge Poster Session Tri-Beta Biology Conference. CMU. April 2013, 2010

Judge Poster Session Tri-Beta Biology Conference. Ft. Lewis College. April 2009

Judge Poster Session Tri-Beta Biology Conference. CMU. April 2008

Interagency Sage Grouse Committee

Local

Judge Coordinator and CMU liaison for the Western Colorado Science Fair

Board of Directors member. Desert Ecological and Restoration Organization (DEAR)

Board of Directors member for the Grand Valley Audubon Society

Colorado Canyons Association-Desert Mammals and their Ecology in Devil's Canyon. May 2014.

Lincoln Orchard Mesa Field Trip with third graders to the desert to learn about desert ecology. April 2013.

Young Scientist Series at the Mesa County Public Library. Desert Animals and their Adaptations. February 2013.

BLM and Volunteers for Outdoor Colorado Public Lands Day. Led hikes and gave presentations on desert ecology in Bangs Canyon. September 2012.

Colorado Canyons Association-Assisted on a wildflower talk in Pollack Canyon. June 2012.

Young Scientist Series at the Mesa County Public Library. Desert Animals and their Adaptations. May 2012.

Colorado Canyons Association. Nature Scavenger Hunt at Devil's Canyon. May 2011. Attended Station on Wildlife and Presented to elementary students.

Workshop for Western Colorado Math and Science Center. Presented ecological ideas and scavenger hunt to 2nd graders. 2011

Presentation and hands-on Workshop on Desert Ecology at Scenic Elementary School. 2009

Assisted in Fetal Pig Dissection at East Middle School. 2009

Advised the Tamarisk Coalition on Habitat improvement for Watson Island, Colorado. 2008

Museum of Western Colorado. Presentation on the Galapagos Islands. January 2008.

Presentation to Broadway Elementary Students on Human Anatomy. 2007.
Art Heritage Program. Monthly Presentation to 4th grade class at Broadway Elementary on Artist of the Month. 2007.
Presentation to Broadway Elementary Students on Human Eye and Ear. 2007.
Art Heritage Program. Monthly Presentation to 3rd grade class at Broadway Elementary on Artist of the Month. 2006

Advising:

Multiple SOAR/Freshman Orientation sessions
Multiple Mav Scholars sessions
Multiple Mesa Experiences sessions
Multiple Major & Graduate Fair sessions
Academic Success Week: Presented to students on how to interact with professors. October 2011.
Co-Advisor for the Fish and Wildlife Club 2005-2012
Unofficial Advising to Wildlife Biology students

Professional Experience:

1995-present: Instructor of Biology, Colorado Mesa University

2013

--Presented at the Four Corners Conference for Globalization and the Environment at Colorado Mesa University. Presented a talk about the Mexican-American Border and consequences for wildlife and native Americans. October.
--Summer Faculty Fellow with US Fish and Wildlife Service-Faculty Fellow in Region 10-Alaska for 5 weeks assisting in small research projects and learning how to get jobs for undergraduates. July-Aug.
--Presented to the Deputy Director of the US Fish and Wildlife Service in Washington D.C. on the fellowship in Alaska. August.

2010

--Contracted with DOE (Dept. of Energy). Evaluated a superfund rehabilitated site near Moab, Utah. Monitored the area, censused animal and bird populations, wrote report on findings. April-September.

2007-2006

--Contracted with Grandtravel to accompany grandchildren and grandparents to the Galapagos islands. Gave presentations to children, assisted the travelers. July.

2008-2005

--EDx: Educational Expeditions. Summer programs from June-August. Presented ecological presentations on day trips for children and adult participants on Dinosaur tours, co-contracted with National Geographic Society, American Museum of Natural History, Smithsonian and other University Alumni Groups.

2004-2003

Traveled to Ecuador with CMU. Assisted with student projects and travel logistics. Spent 1 month with 3 students aiding in their research project, in remote cloud forest station.

Shay Y. West, Ph.D.

Department of Biological Sciences
Colorado Mesa University
1100 North Avenue
Grand Junction, CO 81501
970-248-1936
sywest@coloradomesa.edu

Current Position:

Instructor of Biological Sciences, Colorado Mesa University

Education:

Postdoctoral Fellowship, Anschutz Medical Campus, 2009-2010

PhD, Anschutz Medical Campus, 2003-2009. Doctoral dissertation: The Involvement of the Plasminogen Activator System in Alzheimer's Disease, May 2009

Bachelors of Science, Colorado Mesa University, 1996-2003

Professional Experience:

Colorado Mesa University	Instructor of Biology	2011-Present
Community College of Aurora	Adjunct Biology Faculty	2009-2010

Courses Taught:

SUPP 101, Intro to Higher Education
BIOL 101 lecture and lab, General Biology
BIOL 106 lab, Zoology
BIOL 209 lecture and lab, Anatomy and Physiology
BIOL 210 lecture and lab, Anatomy and Physiology II
BIOL 396 Topics course: Biotechnology
BIOL 442 Pharmacology (on-site and online versions)
BIOL 496 Topics course: Neurodegenerative diseases (on-site and online versions)
BIOL 496 Topics course: Thrombosis and Hemostasis (on-site and online versions)
BIOL 496 Topics course: Wound healing (on-site and online versions)
BIOL 496 Topics course: Neuroscience (proposing to add this as a separate lab and lecture in 2017)
BIOL 496 Topics course in: Neurobiology of Mental Illness
BIOL 496 Topics course in: Organ and Joint Replacement (on-site and online versions)
BIOL 496 Topics course in: Inborn Errors of Metabolism

Professional Memberships:

The Society for Neuroscience
Tri-Beta National Honor Society, Epsilon Omicron Chapter

Publications:

Journal Articles:

Gonzalez-Alegre P, Di Paola J, Wang K, Fabbro S, Yu HC, Shaikh TH, Darbro BW, Bassuk AG. 2014. Evaluating Familial Essential Tremor with Novel Genetic Approaches: Is it a Genotyping or Phenotyping Issue? *Tremor Other Hyperkinet Mov* (N Y).

Kahr, Walter et al. 2011. Mutations in NBEAL2, Encoding a BEACH Protein, Cause Gray Platelet Syndrome. *Nature Genetics* **43**:738-40.

Fabbro S, Schaller K, Seeds NW. 2011. Amyloid-beta Levels are Significantly Reduced and Spatial Memory Defects are Rescued in a Novel Neuroserpin-deficient Alzheimer's Disease Transgenic Mouse Model. *J Neurochem* **118**:928-38.

Fabbro, Shay et al. 2011. Homozygosity Mapping with SNP Arrays Confirms 3p21 as a Recessive Locus for Gray Platelet Syndrome and Narrows the Interval Significantly. *Blood* **117**: 3430-3434.

Fabbro, Shay and Nicholas W. Seeds. 2009. Tissue Plasminogen Activator Activity is Dramatically Reduced while Neuroserpin is Up-regulated in the Alzheimer Disease Brain. *Journ Neurochemistry* **109**: 303-315.

Conference Presentations:

Plasminogen Activator Inhibition in Alzheimer's Disease. Presented at the Experimental Biology meeting in San Diego, April 2008.

Plasminogen Activator Inhibition in Alzheimer's Disease. Presented at the Rocky Mountain Regional Neuroscience Group meeting in Denver, CO, May 2008.

The Role of the Plasminogen Activator System in Alzheimer's Disease. Presented at the Rocky Mountain Regional Neuroscience Group meeting in Denver, CO, May 2007.

The Plasminogen Activator System and its Inhibitors in Alzheimer's Disease. Presented at the Hartford Jahnigen Cognitive impairment meeting in Denver, January 2007.

Service:

Judge for Western Colorado Regional Science Fair

Co-advisor for GEMS Club

Gave several presentations for Junior Scientists at the Grand Junction Public Library

Volunteer at the Eureka! Math and Science Center

Matthew C Garhart

Biological Sciences

Education:

State of Colorado Secondary Teacher License 2015

Master of Science: Colorado State University, Bioagricultural and Pest Management 2008

Associate of Music: Mesa State College, Instrumental Music 2000

Bachelor of Science: Mesa State College, Biology with Teacher Certification 1999

Teaching:

Biol 209 Anatomy & Physiology I

Biol 209L Anatomy & Physiology I Lab

Biol 210 Anatomy & Physiology II

Biol 210L Anatomy & Physiology II Lab

Biol 101L General Human Biology Lab

Biol 217 Forensic Entomology

Biol 217L Forensic Entomology Lab

Biol 396 Topics: Insect Collections

Evidence of Continuous Improvement:

Adaptation of new 209 dissection 2016

Insect Collecting Trip to Peru 2016

Professional Development, D 51 2015-2016

Adaptation of new 209 dissection 2015 Professional Development, D 51 2014-2015

Professional Development, D 51 2013-2014

Professional Development, D 51 2012-2013

Professional Development, D 51 2011-2012

Professional Development, D 51 2010-2011

Innovative Materials/Activities:

Use of appropriate PPT

Creation of handouts providing students with an interactive lecture for 209

Field trips in 217, 396, and 101

Creation and curation of CMU Insect Collection, beginning 2014

Prior Professional Experience Relevant to Current Position:

2008-current: Science Teacher, Grand Junction High School, Grand Junction CO

2006-2008: Teacher of Science, Central Middle School, East Corinth ME

George D Gromke, M.D.

Department of Biological Sciences & Physician's Assistant Program
Colorado Mesa University
Grand Junction, Colorado

Education:

Midwestern University, Chicago College of Osteopathy: Orthopaedic Surgeon, 1992
Total Joint Fellowship (Florida Orthopaedic Institute) 1991-92
Orthopaedic Surgery Residency (Grandview Hospital) 1987-91
Rotating Internship (Grandview Hospital) 1985-86
Medical School (Midwestern University) 1981-85
B.S. Biochemistry, Minor Chemistry, University of Illinois, Urbana, 1975-79

Teaching:

Courses Taught: Biology 209 and 209L Anatomy and Physiology I
Biology 241 Pathophysiology
Biology 409 and 409L Gross and Developmental Human Anatomy
Biology 500 and 500L Advanced Human Anatomy
Various topics classes (Pathophysiology, Embryology)

Service:

Attendance at several meetings discussing methods of teaching
Premed Advisor for students in Biological Sciences programs
Advisor for GEMS club (Graduate Education and Medical Sciences)

Experience:

Adjunct faculty for Biological Sciences, Colorado Mesa University 2010 – present
Have given multiple lectures to healthcare professionals (physicians, nurses) at both the state and local level. Have also given talks to the lay public on various medical issues.
Wrote a weekly column in a local paper (The Daily Sentinel) covering various orthopaedic conditions for several months.

Pam McLaughlin, B.A., D.C.

www.pammclaughlinwatercolor.com

970-270-2235, watercolorsplash@gmail.com

2275 Homestead Drive Grand Junction, Colorado 81505

Profile

Physician, Artist and Teacher

Art Work Experience

Watercolor Dogs Art Studio, Owner, Grand Junction, Colorado, 2009-Present

Art Studio and Gallery providing art instruction to children and adults.

Pam McLaughlin Watercolors, 2000-present

Professional watercolor painter specializing in commission work.

Art Students League of Denver Faculty Appointment, Fall 2016

Arvada Center for the Arts, Arvada, Colorado, Instructor, 2016-Present

Artist in residence, Appleton Elementary, Grand Junction, Colorado, 2006-2009

Developed and implemented age appropriate art curriculum for kindergarten through fifth grade.

After School Art Program, Appleton Elementary, Grand Junction, Colorado, 2003-2005

Created and taught after school art program for kindergarten through fifth grade.

Medical Work Experience

Marillac Clinic, Grand Junction, Colorado, primary care physician, 2002-2004

Wheat Ridge Regional Center, Wheat Ridge, Colorado, primary care physician for developmentally disabled, 1998-1999, 1990-1991

Winter Park Medical Clinic, Winter Park, Colorado, Granby Medical Clinic, Granby, Colorado, Emergency Medicine and General Practice Physician, 1991-1994

Art Education Studied Under

Liu Yi, Advanced Portraits in Watercolor Scott Christensen, Landscape Painting David Drummond,

Watercolor Painting

John Fawcett, Watercolor Painting

Medical Education

Emergency Medicine Residency, Michigan State University, Lansing, Michigan, 1994-1996

Rotating Internship, Atlantic City Medical Center, Atlantic City, New Jersey, 1989-1990

D.O., University of Medicine and Dentistry of New Jersey School of Osteopathic Medicine, 1985-1989

B.A. Biology, University of Vermont, Burlington , Vermont, 1981-1985

Medical Licensure Colorado, no restrictions

DEA, no restrictions

Art Shows/ Memberships

American Watercolor Society's 148th International Show, New York City, New York, 2015

Scottsdale's Best and Brightest Show, Scottsdale, Arizona 2015

First World Watercolor Competition, The Art of Watercolor Magazine, semifinalist, 2014

Western Federation of Watercolor Society's 2016 Show, Arvada, Colorado Colorado Watercolor Society's

State Exhibit 2016, 2015

International Guild of Realism, Juried Member 2014-Present Art Cantina, Founding Member, 2015-Present

References furnished upon request

Andrea (Annie) Sellers, DC

267 1/2 Nashua Lane

Grand Junction, Colorado, 81503

970-250-5620

AnnieSellers.RealHealth@gmail.com

WORK EXPERIENCE

REAL HEALTH CHIROPRACTIC - Grand Junction, CO

Chiropractor January 2014 - Present

- Caring for patients in the office. Conducting thorough physical examinations. Billing and other back office duties.

Other miscellaneous work experience from High School through Undergraduate studies. Will give details if requested.

EDUCATION

Mesa State College - Grand Junction, CO

- Graduated in 2004
- Graduated with a BS in Biological Sciences in 2009. In the course of my studies, I exhausted all of the Anatomy and Physiology, Endocrinology, and any other human biology class I could take. I also worked for multiple semesters in the Tutoring Center for the same subjects.
In addition, Dr. Forbes Davidson asked me to be the first Lab Teacher Aide for the Anatomy Lab, which I did several times for him and for Dr. Gwiazdowski.

Parker University College of Chiropractic – Dallas, TX

- Concurrent Degree along with DC

Parker University College of Chiropractic – Dallas, TX

- Graduated in December of 2013
- Currently practicing as a Chiropractor in Grand Junction, CO

ADDITIONAL SKILLS

- I have always enjoyed teaching, especially Anatomy, and have been told that I have a talent for making things easily understood.

Judith M. Sirota
Colorado Mesa University
Grand Junction, Colorado Mesa University

Education:

MS, Michigan State University, Natural Science - Entomology, East Lansing, MI, 1990

BS Colorado State University, Biological Sciences - Entomology, Fort Collins, CO, 1983

AS Mesa College (Colorado Mesa University), Biological Sciences - Agriculture, Grand Junction, CO, 1981

Professional Experience:

2017-present: Instructor/Assistant Laboratory Coordinator, Department of Biological Sciences, Colorado Mesa University.

2011-2017: Jude's Biological Consulting: Conducted training workshops for continuing education credits to licensed pesticide applicators in Colorado.

2011-2017: Co-teach the Family to Family class for families/friends of loved ones with mental illness for the National Alliance for Mental Illness. Subject matter includes biological basis for mental illness, brain function, social and psychological dysfunction, and developing coping and communication skills for family members.

Teaching:

BIOL101L – General Human Biology Lab

BIOL209L - Anatomy and Physiology I Lab

BIOL210L - Anatomy and Physiology II Lab

Evidence of Continuous Improvement

I review my materials every semester, bringing new materials to the labs, e.g. new techniques in joint replacement, new drugs/treatments for sexually transmitted diseases, information on the hazards of vaping.

Innovative Materials/Activities

BIOL101L Materials and Activities determined by curriculum. I've brought my experience as an invasive species manager to the class field trips, discussing how invasive species impact local native species and ecosystems.

BIOL210L Use of YouTube videos to illustrate cell division, fertilization, arthroscopy and other videos suitable for this class. Students have commented on evaluations that these helped them learn the material. Introduced simulated blood typing exercise, adopted by other faculty in this course.

Scholarship and Creative Work:

Book Chapters – NEW Biology 210 Human Anatomy and Physiology Lab Manual: contributed materials for 5 lab sections.

Honors and Awards:

National Alliance for Mental Illness Education Hall of Fame 2016 -awarded for excellence in teaching the NAMI Family to Family Class (7 years)

Appendix D

Library Data

**Library Assessment for Support of the Biology Program
Tomlinson Library
Colorado Mesa University**

Date of assessment: **August 20, 2019**

Collection under review: **Biological Sciences**

Program level: Certificate Associates Bachelors Masters

Librarian: **Jay Ballenberger**

1. Current Collection Review

a. Reference Sources:

The library's print and online reference collections provide both range and depth of information for Biological Science students and practitioners in the field.

Dictionaries

The Dictionary of Cell and Molecular Biology (2013) (online)

A Dictionary of Genetics (2013) (online)

Dictionary of Zoo Biology and Animal Management (2013) (online)

Dictionary of Developmental Biology and Embryology (2012) (online)

Gaither's Dictionary of Scientific Quotations: A Collection of Approximately 27,000 Quotations Pertaining to Archaeology, Architecture, Astronomy, Biology, Botany, Chemistry,... (2012) (online)

A Dictionary of Entomology (2011)

Dorland's Illustrated Medical Dictionary (2011) (online)

A Dictionary of Biomedicine (2010) (online)

A Dictionary of Ecology (2010) (online)

The New Oxford Dictionary for Scientific Writers and Editors (2009) (online)

A Dictionary of Biology (2008) (online)

A Dictionary of Genetics (2006) (online)

Oxford Dictionary of Biochemistry and Molecular Biology (2006) (online)

Dictionary of Medical Acronyms & Abbreviations (2005)

Animal Behavior Desk Reference: A Dictionary of Animal Behavior, Ecology, and Evolution (2001)

Dictionary of Ecology and the Environment (2001)

The Facts on File Dictionary of Biotechnology and Genetic Engineering (2001)

Encyclopedias

Encyclopedia of Ecology (2019)

Encyclopedia of Marine Mammals (2018) (online)

Encyclopedia of Ethics (2016)

Concise Encyclopaedia of Bioinformatics and Computational Biology 2e (2014) (online)

Encyclopedia of Cultivated Plants (2013) (online)
Encyclopedia of Systems Biology (2013) (online)
Encyclopedia of Theoretical Ecology (2012) (online)
Encyclopedia of Biotechnology in Agriculture and Food (2011) (online)
Encyclopedia of Genetics, Genomics, Proteomics, and Informatics (2008) (online)
Encyclopedia of Molecular Pharmacology (2008) (online)
The Merck Index: An Encyclopedia of Chemicals, Drugs, and Biologicals (2006)
Grzimek's Animal Life Encyclopedia (2003) (online)
Encyclopedia of Environmental Studies (2001)
The Encyclopedia of Genetic Disorders and Birth Defects (2000)
Encyclopedia of Human Evolution and Prehistory (2000)
Blackwell's Concise Encyclopedia of Ecology (1999) (online)

Handbooks

Handbook of Developmental Neurotoxicology (2018) (online)
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Biology Orientation : A Guide to Success as a Biology Major (2016)
Biomedical Research : An Insider's Guide (2016) (online)
Handbook of Marine Microalgae : Biotechnology Advances (2015) (online)
Handbook of Vascular Biology Techniques (2015) (online)
The Handbook of Plant Biosecurity: Principles and Practices for the Identification, Containment and Control of Organisms that Threaten Agriculture and the Environment Globally (2014) (online)
How to do Ecology: A Concise Handbook (2014) (online)
Springer Handbook of Bio-/Neuroinformatics (2014) (online)
Marine Microbiology: Bioactive Compounds and Biotechnological Applications (2013) (online)
Professional Guide to Diseases (2013)
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Animal Behavior Desk Reference: A Dictionary of Animal Behavior, Ecology, and Evolution (2001)
Scientific American Science Desk Reference (1999)
Molecular Biology and Biotechnology: A Comprehensive Desk Reference (1995)

b. Monographic Sources:

The library's book collection offers generally strong support for the Biological Science's program concentration of Ecology, Evolution, and Organismal Biology. Library holdings for specific curricular areas are indicated below.

Keyword	CMU Print Titles	CMU Print Titles since 2010	ebooks	ebooks since 2010
Biology	2,012	306	15,053	4,827
Evolution (Biology)	374	86	1,169	837
Ecology	2,870	335	2,743	1,955
Biochemistry	237	24	1,126	793
Anatomy	871	281	2,439	1,877
Genetics	1,093	229	5,690	4,248
Biochemistry	243	24	1,126	793
Animal Biology	192	60	916	669
Cytology	73	3	456	309
Developmental Biology	61	18	385	267
Plant Biology	206	40	866	642
Totals	8,232	1,406	31,969	17,217

The current collection within the above listed keyword areas is strong. Although only **17%** of the print collection has been published since 2010, this is significantly augmented by the ebook collection, **54%** of which have been published since 2010. The total combined number of print and ebook titles is **40,201**. The total combined number of print and ebooks published since 2010 is **18,623**, or **46%** of this selection.

Electronic Resources

As detailed in the table above, the library provides online access to over **30,000** ebooks relevant for courses within the Biological Sciences AS program. **46%** of these available ebook titles were published since 2010, supplementing the much lower number of print holdings from that same time period.

Databases that have articles and/or indexed content covering topics within the Biological Science's concentration of Ecology, Evolution, and Organismal Biology include: Biological Abstracts, JSTOR, Agricola, BioMed Central, Science Direct Freedom Collection, Science Reference Center, Wiley Online Library, Gale Virtual Reference Library, The Directory of Open Access Journals, and more. These databases will have a wealth of full-text articles available for student consideration and use in research and other assignments.

c. Periodicals (online and print)

Current Subscriptions:

The following is a sample of journals currently subscribed to by CMU's Tomlinson Library. This list includes the database name and dates of holdings currently available, including online full-text and, if applicable, journals available in print.

American Naturalist (JSTOR - Biological Collection, 03/01/1867 to 12/01/2015)

Animal Behavior (Science Direct, 01/01/1958 to current)

Biological Journal of the Linnean Society (Academic Search Complete, 01/01/2003 to 08/20/2018)
Ecological Entomology (Wiley Online Library, 01/01/1997 to current)
Ecological Research (Academic Search Complete, 03/01/1998 to 08/20/2018)
Ecology (JSTOR Biological Sciences Collection, 01/01/1920 to 12/01/2016; Wiley Online Library 1997-current)
Evolution & Development (Wiley Online Library, 01/01/1999 to current)
Functional Ecology (Wiley Online Library, 01/01/1997 to current)
Genome Biology (BioMed Central Journals, 01/01/2000 to current)
Insects (Academic Search Complete, 12/01/2011 to current)
Journal of Evolutionary Biology (Wiley Online Library, 01/01/1997 to current)
Journal of Immunology Research (Academic Search Complete, 01/01/2014 to current)
Journal of Zoology (Wiley Online Library, 01/01/1997 to current)
Limnology & Oceanography (JSTOR Biological Sciences Collection, 01/01/1956 to 11/01/2008; Wiley Online Library 01/01/1996 to current)
Marine Biology (Berlin) (Academic Search Complete, 01/01/2003 to 08/20/2018)
Native Plants Journal (Project Muse 03/01/2004 to current)
Nature (Academic Search Complete, 06/05/1997 to 11/27/2015, some print and microfiche holdings dating from 1965)
Nature Biotechnology (Academic Search Complete, 11/01/1998 to 11/01/2015)
The Plant Cell (JSTOR – Biological Sciences Collection, 01/01/1989 to 12/01/2016)
Trends in Plant Science (Science Direct, 1996-current)
Trends in Ecology & Evolution (Science Direct, 01/01/1986 to current)

Hundreds of other journals of interest to the Biological Science program concentration of Ecology, Evolution, and Organismal Biology are available in full text through the library article databases.

Biological Science-appropriate databases can be located through the following steps: Library homepage >> Click search tab for Articles >> Click Browse Databases by Subject >> Use the dropdown list to select **Biological Sciences** (default: All Subjects).

Interlibrary loan is a quick, efficient, and useful supplement to our collections, as well, with an average turn-around time of just 11 hours for articles. Such fast request-to-delivery times greatly aid students in their information needs being addressed and processed as close to the time of need as possible. As students often work close to deadlines so must our services work as favorably with those deadlines as possible.

d. Media

The Library subscribes to *Films on Demand* – a streaming video service from Films Media Group. This service includes educational films, documentaries, and PBS publications. These films can be accessed through course content links added to D2L, if the faculty member chooses, for convenient access to the student(s) and/or can be streamed into the physical classroom as well.

Films on Demand streaming videos can be searched by keyword or, alternately, one can browse discipline specific collections. The browseable **Biology** collection returns **2,152** titles within the 7 sub-collections of **Animal Biology, Ecology, General Biology, Human Anatomy and Physiology, Marine Biology, Microbiology, and Plant Biology**

2. Library Research Support Statement:

The Library can offer research support for specific courses – through **instructional sessions** (how to access and use our research tools, how to evaluate information and sources, how to use information ethically, etc.) as well as/or an “**embedded librarian**” in the D2L areas CMU course sections. The Library can also create **research/course guides** for CMU course sections – tailoring links, tools, e-reserve access, and more to the students and the topic of that section.

If desired, courses can make use of all of these options and the Library is interested in investigating customized possibilities and collaborative efforts with faculty.

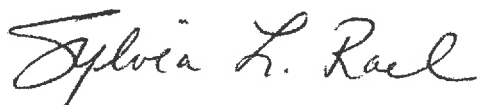
3. Recommendations for additions to the collection:

As mentioned above, the collection is strong. Although only **17%** of the print collection has been published since 2010, this is significantly augmented by the ebook collection, **46%** of which have been published since 2010. The total combined number of print and ebooks published since 2010 is **18,623**, or **46%** of this selection.

In collaboration with department faculty, the library has developed core print and online collections to support coursework within the Biological Science program and in particular for the newly created concentration of Ecology, Evolution, and Organismal Biology. Selecting new materials in support of the Ecology, Evolution, and Organismal Biology concentration should be ongoing. Presently the library resources for this concentration are quite strong.

New titles for this course will be purchased on the recommendations of the departmental faculty and from standard selection sources. A list of potential titles of interest will be circulated to relevant instructors to aid in acquisition efforts for this program.

Library Director:



Date: August 21, 2019

**Library Assessment for Support of the Biology Program
Tomlinson Library
Colorado Mesa University**

Date of assessment: **August 19, 2019**

Collection under review: **Biological Sciences: Cellular, Molecular & Developmental Biology Concentration**

Program level: Certificate Associates Bachelors Masters

Librarian: **Jay Ballenberger**

1. Current Collection Review

a. Reference Sources:

The library's print and online reference collections provide both range and depth of information for Biological Science students and practitioners in the field.

Dictionaries

The Dictionary of Cell and Molecular Biology (2013) (online)

A Dictionary of Genetics (2013) (online)

Dictionary of Zoo Biology and Animal Management (2013) (online)

Dictionary of Developmental Biology and Embryology (2012) (online)

Gaither's Dictionary of Scientific Quotations: A Collection of Approximately 27,000 Quotations Pertaining to Archaeology, Architecture, Astronomy, Biology, Botany, Chemistry,...(2012) (online)

A Dictionary of Entomology (2011)

Dorland's Illustrated Medical Dictionary (2011) (online)

A Dictionary of Biomedicine (2010) (online)

A Dictionary of Ecology (2010) (online)

The New Oxford Dictionary for Scientific Writers and Editors (2009) (online)

A Dictionary of Biology (2008) (online)

A Dictionary of Genetics (2006) (online)

Oxford Dictionary of Biochemistry and Molecular Biology (2006) (online)

Dictionary of Medical Acronyms & Abbreviations (2005)

Animal Behavior Desk Reference: A Dictionary of Animal Behavior, Ecology, and Evolution (2001)

Dictionary of Ecology and the Environment (2001)

The Facts on File Dictionary of Biotechnology and Genetic Engineering (2001)

Encyclopedias

Encyclopedia of Ecology (2019)

Encyclopedia of Marine Mammals (2018) (online)

Encyclopedia of Ethics (2016)

Concise Encyclopaedia of Bioinformatics and Computational Biology 2e (2014) (online)

Encyclopedia of Cultivated Plants (2013) (online)
Encyclopedia of Systems Biology (2013) (online)
Encyclopedia of Theoretical Ecology (2012) (online)
Encyclopedia of Biotechnology in Agriculture and Food (2011) (online)
Encyclopedia of Genetics, Genomics, Proteomics, and Informatics (2008) (online)
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The Merck Index: An Encyclopedia of Chemicals, Drugs, and Biologicals (2006)
Grzimek's Animal Life Encyclopedia (2003) (online)
Encyclopedia of Environmental Studies (2001)
The Encyclopedia of Genetic Disorders and Birth Defects (2000)
Encyclopedia of Human Evolution and Prehistory (2000)
Blackwell's Concise Encyclopedia of Ecology (1999) (online)

Handbooks

Handbook of Developmental Neurotoxicology (2018) (online)
A Practical Guide to Biomedical Research : For the Aspiring Scientist (2017) (online)
Biology Orientation : A Guide to Success as a Biology Major (2016)
Biomedical Research : An Insider's Guide (2016) (online)
Handbook of Marine Microalgae : Biotechnology Advances (2015) (online)
Handbook of Vascular Biology Techniques (2015) (online)
The Handbook of Plant Biosecurity: Principles and Practices for the Identification, Containment and Control of Organisms that Threaten Agriculture and the Environment Globally (2014) (online)
How to do Ecology: A Concise Handbook (2014) (online)
Springer Handbook of Bio-/Neuroinformatics (2014) (online)
Marine Microbiology: Bioactive Compounds and Biotechnological Applications (2013) (online)
Professional Guide to Diseases (2013)
Handbook of Clinical Pediatric Endocrinology (2012) (online)
Handbook of Industrial Chemistry and Biotechnology (2012) (online)
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Professional Reference Sources

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Scientific American Science Desk Reference (1999)
Molecular Biology and Biotechnology: A Comprehensive Desk Reference (1995)

b. Monographic Sources:

The library's book collection offers generally strong support for the Biological Science's program concentration of Cellular, Molecular, & Developmental Biology. Library holdings for specific curricular areas are indicated below.

Keyword	CMU Print Titles	CMU Print Titles since 2010	ebooks	ebooks since 2010
Biology	2,012	306	15,053	4,827
Anatomy	871	281	2,439	1,877
Molecular Biology	152	27	1,146	725
Biochemistry	243	24	1,126	793
Toxicology	632	56	843	577
Aging	2,124	220	1,727	1,343
Biometry	2	2	168	137
Genetics	1,093	229	5,690	4,248
Cell Biology	57	15	548	401
Cytology	73	3	456	309
Developmental Biology	61	18	385	267
Metabolism	243	78	1,623	1,268
Totals	7,563	1,259	31,204	16,772

The current collection within the above listed keyword areas is strong. Although only **16%** of the print collection has been published since 2010, this is significantly augmented by the ebook collection, **54%** of which have been published since 2010. The total combined number of print and ebook titles is **38,767**. The total combined number of print and ebooks published since 2010 is **18,031**, or **47%** of this selection.

Electronic Resources

Databases that have articles and/or indexed content covering topics within the Biological Science's concentration of Cellular, Molecular, & Developmental Biology include: Biological Abstracts, JSTOR, Agricola, BioMed Central, Science Direct Freedom Collection, Science Reference Center, Wiley Online Library, Gale Virtual Reference Library, The Directory of Open Access Journals, and more. These databases have a wealth of full-text articles available for student research and other assignments.

c. Periodicals (online and print)

Current Subscriptions:

The following is a sample of journals currently subscribed to by CMU's Tomlinson Library. This list includes the database name and dates of holdings currently available, including online full-text and, if applicable, journals available in print.

- Aging* (Academic Search Complete, 01/01/1990 to 01/01/1994, some in print up to 1996)
- Anatomy Research International* (Academic Search Complete, 01/01/2011 to current)
- Biology of the Cell (Paris)* (Wiley Online Library, 01/01/1997 to current)
- Biometrics* (Wiley Online Library, 01/01/1999 to current, some print)
- Cell Biochemistry & Function* (Wiley Online Library, 01/01/1996 to current)
- Cell Proliferation* (Wiley Online Library, 01/01/1968 to current)

Cell Structure & Function (J-STAGE Open Access Journals, 01/01/1975 to 12/31/2017)
Development (Cambridge) (PubMedCentral Journals, 01/01/1987 to 08/19/2018)
Developmental Dynamics (Wiley Online Library, 01/01/1996 to current)
Electronic Journal of Biotechnology (Directory of Open Access Journals, 01/01/2008 to current)
Experimental Cell Research (Science Direct, 01/01/1950 to current)
Fundamental & Applied Toxicology (Science Direct, 01/01/1996 to 08/19/2018)
Journal of Anatomy (PubMedCentral Journals, 01/01/1997 to current)
Journal of Biochemistry (Academic Search Complete, 01/01/1996 to 08/19/2018)
Journal of Cellular Biochemistry (Wiley Online Library, 01/01/1996 to current)
Metabolic Engineering (Science Direct, 01/01/1999 to current)
Plant & Cell Physiology (Academic Search Complete, 01/01/1996 to 08/19/2018)
Research on Aging: an international bimonthly journal (Sage Premier Collection, 01/01/1999 to current)

Hundreds of other journals of interest to the Biological Science program concentration of Cellular, Molecular, & Developmental Biology are available in full text through the library article databases.

Biological Science-appropriate databases can be located through the following steps: Library homepage >> Click search tab for Articles >> Click Browse Databases by Subject >> Use the dropdown list to select **Biological Sciences** (default: All Subjects).

Interlibrary loan is a quick, efficient, and useful supplement to our collections, as well, with an average turn-around time of just 11 hours for articles. Such fast request-to-delivery times greatly aid students in their information needs being addressed and processed as close to the time of need as possible. As students often work close to deadlines so must our services work as favorably with those deadlines as possible.

d. Media

The Library subscribes to *Films on Demand* – a streaming video service from Films Media Group. This service includes educational films, documentaries, and PBS publications. These films can be accessed through course content links added to D2L, if the faculty member chooses, for convenient access to the student(s) and/or can be streamed into the physical classroom as well.

Films on Demand streaming videos can be searched by keyword or, alternately, one can browse discipline specific collections. The browseable **Biology** collection returns **2,152** titles within the 7 sub-collections of **Animal Biology, Ecology, General Biology, Human Anatomy and Physiology, Marine Biology, Microbiology, and Plant Biology.**

2. Library Research Support Statement:

The Library can offer research support for specific courses – through **instructional sessions** (how to access and use our research tools, how to evaluate information and sources, how to use information ethically, etc.) as well as/or an “**embedded librarian**” in the D2L areas CMU course sections. The Library can also create **research/course guides** for CMU course sections – tailoring links, tools, e-reserve access, and more to the students and the topic of that section.

If desired, courses can make use of all of these options and the Library is interested in investigating customized possibilities and collaborative efforts with faculty.

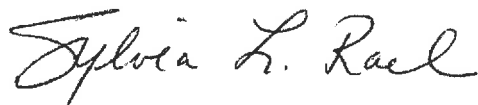
3. Recommendations for additions to the collection:

As mentioned above, the collection is quite strong. Although only 16% of the print collection has been published since 2010, this is significantly augmented by the ebook collection, **54%** of which have been published since 2010. Also, this print collection has seen a 3% growth in titles published within the past 10 years as compared to the previous program assessment when only 13% had been published in the past 10 years. The total combined number of print and ebook titles is **38,767**. The total combined number of print and ebooks published since 2010 is **18,031**, or **47%** of the collection.

In collaboration with department faculty, the library has developed core print and online collections to support coursework within the Biological Science program and in particular for the newly created concentration of Cellular, Molecular, & Developmental Biology. Selecting new materials in support of the Cellular, Molecular, & Developmental Biology concentration should be ongoing. Presently library resources for this concentration are strong.

New titles for this course will be purchased on the recommendations of the departmental faculty and from standard selection sources. A list of potential titles of interest will be circulated to relevant instructors to aid in acquisition efforts for this program.

Library Director:



Date: August 21, 2019

**Library Assessment for Support of the Biology Program
Tomlinson Library
Colorado Mesa University**

Date of assessment: **August 20, 2019**

Collection under review: **Biological Sciences: Ecology, Evolution, and Organismal Biology
Concentration**

Program level: Certificate Associates Bachelors Masters

Librarian: **Jay Ballenberger**

1. Current Collection Review

a. Reference Sources:

The library's print and online reference collections provide both range and depth of information for Biological Science students and practitioners in the field.

Dictionaries

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A Dictionary of Genetics (2013) (online)

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Dictionary of Developmental Biology and Embryology (2012) (online)

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Dictionary of Ecology and the Environment (2001)

The Facts on File Dictionary of Biotechnology and Genetic Engineering (2001)

Encyclopedias

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Encyclopedia of Marine Mammals (2018) (online)

Encyclopedia of Ethics (2016)

Concise Encyclopaedia of Bioinformatics and Computational Biology 2e (2014) (online)

Encyclopedia of Cultivated Plants (2013) (online)
Encyclopedia of Systems Biology (2013) (online)
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Encyclopedia of Biotechnology in Agriculture and Food (2011) (online)
Encyclopedia of Genetics, Genomics, Proteomics, and Informatics (2008) (online)
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Marine Microbiology: Bioactive Compounds and Biotechnological Applications (2013) (online)
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b. Monographic Sources:

The library's book collection offers generally strong support for the Biological Science's program concentration of Ecology, Evolution, and Organismal Biology. Library holdings for specific curricular areas are indicated below.

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Entomology	55	8	91	65
Population Biology	43	5	47	29
Natural Selection	94	20	116	75
Animal Behavior	95	19	82	54
Genetics	1,055	222	5,690	4,248
Marine Biology	62	6	44	27
Zoology	203	12	200	90
Totals	7,100	1,042	26,361	13,000

The current collection within the above listed keyword areas is strong. Although only **15%** of the print collection has been published since 2010, this is significantly augmented by the ebook collection, **49%** of which have been published since 2010. The total combined number of print and ebook titles is **47,503**. The total combined number of print and ebooks published since 2010 is **14,042**, or **30%** of this selection.

Electronic Resources

As detailed in the table above, the library provides online access to over **26,000** ebooks relevant for courses within the Biological Science's program concentration of Ecology, Evolution, and Organismal Biology. **50%** of these available ebook titles were published since 2010, supplementing the much lower number of print holdings from that same time period.

Databases that have articles and/or indexed content covering topics within the Biological Science's concentration of Ecology, Evolution, and Organismal Biology include: Biological Abstracts, JSTOR, Agricola, BioMed Central, Science Direct Freedom Collection, Science Reference Center, Wiley Online Library, Gale Virtual Reference Library, The Directory of Open Access Journals, and more. These databases will have a wealth of full-text articles available for student consideration and use in research and other assignments.

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Ecological Entomology (Wiley Online Library, 01/01/1997 to current)
Ecological Research (Academic Search Complete, 03/01/1998 to 08/20/2018)
Ecology (JSTOR Biological Sciences Collection, 01/01/1920 to 12/01/2016; Wiley Online Library 1997-current)
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Functional Ecology (Wiley Online Library, 01/01/1997 to current)
Genome Biology (BioMed Central Journals, 01/01/2000 to current)
Insects (Academic Search Complete, 12/01/2011 to current)
Journal of Evolutionary Biology (Wiley Online Library, 01/01/1997 to current)
Journal of Immunology Research (Academic Search Complete, 01/01/2014 to current)
Journal of Zoology (Wiley Online Library, 01/01/1997 to current)
Limnology & Oceanography (JSTOR Biological Sciences Collection, 01/01/1956 to 11/01/2008; Wiley Online Library 01/01/1996 to current)
Marine Biology (Berlin) (Academic Search Complete, 01/01/2003 to 08/20/2018)
Native Plants Journal (Project Muse 03/01/2004 to current)
Nature (Academic Search Complete, 06/05/1997 to 11/27/2015, some print and microfiche holdings dating from 1965)
Nature Biotechnology (Academic Search Complete, 11/01/1998 to 11/01/2015)
The Plant Cell (JSTOR – Biological Sciences Collection, 01/01/1989 to 12/01/2016)
Trends in Plant Science (Science Direct, 1996-current)
Trends in Ecology & Evolution (Science Direct, 01/01/1986 to current)

Hundreds of other journals of interest to the Biological Science program concentration of Ecology, Evolution, and Organismal Biology are available in full text through the library article databases.

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The Library can offer research support for specific courses – through **instructional sessions** (how to access and use our research tools, how to evaluate information and sources, how to use information ethically, etc.) as well as/or an “**embedded librarian**” in the D2L areas CMU course sections. The Library can also create **research/course guides** for CMU course sections – tailoring links, tools, e-reserve access, and more to the students and the topic of that section.

If desired, courses can make use of all of these options and the Library is interested in investigating customized possibilities and collaborative efforts with faculty.

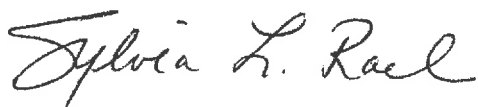
3. Recommendations for additions to the collection:

As mentioned above, the collection is quite strong. Although only **15%** of the print collection has been published since 2010, this is significantly augmented by the ebook collection, **49%** of which have been published since 2010. The total combined number of print and ebooks published since 2010 is **14,042**, or **30%** of this selection.

In collaboration with department faculty, the library has developed core print and online collections to support coursework within the Biological Science program and in particular for the newly created concentration of Ecology, Evolution, and Organismal Biology. Selecting new materials in support of the Ecology, Evolution, and Organismal Biology concentration should be ongoing. Presently the library resources for this concentration are quite strong.

New titles for this course will be purchased on the recommendations of the departmental faculty and from standard selection sources. A list of potential titles of interest will be circulated to relevant instructors to aid in acquisition efforts for this program.

Library Director:



Date: August 21, 2019

Appendix E

Student Learning Objectives (SLOs), Assessment Plan, and Curriculum Map of SLOs

Department of Biological Sciences

Student Learning Objectives

All CMU baccalaureate and associate graduates are expected to demonstrate proficiency in critical thinking, communication fluency, quantitative fluency, and specialized knowledge/applied learning. In addition to these campus-wide student learning outcomes, graduates of this major will be able to:

1. Demonstrate a breadth of knowledge in the life sciences with an accompanying depth of knowledge particularly in the key areas of organismal diversity, ecology, evolution, and genetics. (Specialized Knowledge)
2. Utilize the scientific approach to address novel questions and problems through the development of hypotheses, design of experiments, collection of data, analysis of data, and interpretation of results. (Quantitative Fluency/Applied Learning)
3. Identify, examine, evaluate, and discuss the scientific literature. (Critical Thinking)
4. Articulate biological principles and ideas effectively, both in written and oral form. (Communication Fluency)

Biological Sciences – Secondary Education

Student Learning Objectives

All CMU baccalaureate and associate graduates are expected to demonstrate proficiency in critical thinking, communication fluency, quantitative fluency, and specialized knowledge/applied learning. In addition to these campus-wide student learning outcomes, graduates of this major will be able to:

1. Utilize the scientific approach to address novel questions and problems through the development of hypotheses, design of experiments, collection of data, analysis of data, and interpretation of results. (Quantitative Fluency/Applied Learning)
2. Identify, examine, evaluate and discuss the scientific literature. (Critical Thinking)
3. Articulate biological principles and ideas effectively, both in written and oral form. (Communication Fluency)
4. Instruct students based on self-written learning plans to address individual learning and developmental patterns in the Biological Sciences. (Specialized Knowledge)
5. Design a safe and supportive learning environment for secondary education students. (Applied Learning)
6. Apply Biology content knowledge while working with learners to access information in real world settings assuring learner mastery of Biological Sciences. (Specialized Knowledge)
7. Integrate assessment, planning, and instructional strategies in coordinated and engaging ways through multiple means of communication. (Critical Thinking/Communication Fluency)
8. Engage in meaningful and intensive professional learning and self-renewal by regularly examining practice through ongoing study, self-reflection, and collaboration. (Specialized Knowledge)

COLORADO MESA UNIVERSITY
Program Outcome and Assessment Plan Template

Program Name: Biological Sciences curriculum map

Date: Updated September 2019

Program Outcomes	Courses/Educational Strategies Indicate if outcome is Beginning(B), Developing(D) or Advanced(A)	Assessment Method(s)	Time of Data Collection/ Person Responsible	Results of Assessment	Actions Taken
Outcome #1 Students will demonstrate a broad, comprehensive knowledge of the main areas of biology (including evolution, diversity, ecology, cell biology and genetics) and the ability to apply this knowledge to address new questions. (Specialized Knowledge)	Core courses: BIOL 105/105L (B) or BIOL 208/208L (B) BIOL 301/301L (B) Major Fields Test (A) Exit survey (A)	What: Exam questions or assignments in the courses How: Assessment embedded questions What: National Test How: Assessment indicators cover diversity of organisms, animals, plants, population genetics and evolution, and ecology What: Alumni & Exit survey given to graduating seniors How: Questions on the survey relate to the student's feelings about their level of biological knowledge	Who: All course instructors When: Either at the end of the semester or during the semester, depends on the course. Who: Campus testing center When: Semester before graduation Who: CMU marketing and the foundation gather alumni info & the department administrative assistant gathers exit surveys from graduating seniors When: Summer surveys & the Semester before graduation	Results: Key Findings: Conclusions: See assessment summary	Action: Re-evaluation Date: See assessment summary

<p>Outcome #2 Students will demonstrate the ability to use science as a way of thinking and problem solving. They will be able to make key observations, ask questions, formulate hypotheses, design experiments, collect and analyze data, draw logical conclusions and explain and defend those conclusions to others.</p>	<p>BIOL 105L (B) Or BIOL 301L (D)</p>	<p>What: Rubric for grading lab reports. How: The reports will demonstrate the student's ability to collect and analyze data, and explain conclusions</p> <p>What: Rubric for grading both written and oral presentations How: students will design experiments, analyze data, and explain conclusions in both written and oral form</p>	<p>Who: All instructors When: As students complete written assignments related to the laboratory experiments</p> <p>Who: All instructors When: Students complete a semester long genetics experiment</p>	<p>Results: Key Findings: Conclusions:</p>	<p>Action: Re-evaluation Date:</p>
<p>(Quantitative fluency/Applied Learning)</p>	<p>Major Fields Test (A) Exit Surveys (A)</p>	<p>What: National Test How: Assessment indicator for analytical skills</p> <p>What: Alumni & Exit surveys How: Questions on the survey relate to the student's feelings about their critical thinking skill, quantitative reasoning, as well as written and oral communication skills</p>	<p>Who: Campus testing center When: Semester before graduation</p> <p>Who: CMU Alumni & The assistant gathers exit surveys from graduating seniors When: Semester before graduation</p>	<p>Results: Key Findings: Conclusions:</p>	<p>Action: Re-evaluation Date:</p>
<p>Outcome #3 Students will demonstrate the ability to critically search, read, evaluate and discuss primary literature.</p>	<p>BIOL 208 (B)</p>	<p>What: Assignments related to primary literature How: Grading rubric to indicate the level of understanding</p>	<p>Who: Course instructors When: During the semester</p>	<p>Results: Key Findings: Conclusions:</p>	<p>Action: Re-evaluation Date:</p>

(Critical Thinking)	BIOL 301 (B)	What: Assignments related to current topics in genetics How: Grading rubric to indicate discussion of current topics	Who: Course Instructors When: During the semester	Results: Key Findings: Conclusions:	A R
	BIOL 483 (D)	What: Students search biological primary literature to prepare an in-depth thesis How: Grading rubric	Who: Course instructors When: At the end of the semester		
	BIOL 105L (B) or BIOL 208 (B)	What: Lab reports How: Grading rubric	Who: Course Instructors When: During the semester		
	BIOL 483 (B)	What: Written reports and How: Grading rubric.	Who: Course instructors When: End of semester		
Outcome #4 Students will demonstrate effective Biological communication skills, both in writing and orally. ((Communication fluency))					

Adapted from Long Beach City College and Indiana State University Assessment Plans

Basic (B): retention and comprehension Developing (D): analysis and application Advanced (A): evaluation and creation

The core courses for the Biology program are BIOL 105/105L Attributes of Living Systems; 208/208L Fundamentals of Ecology and Evolution; 301/301L Principles of Genetics; and 483 Senior Thesis. Students then select additional course work or take required courses depending on the Biology Track: B.S. Biology, CMDB, or EEOB. Students in the Secondary education track are required to take BIOL 105/105L and BIOL 483 Senior Thesis.

Curriculum Map of Biological Sciences Student Learning Objectives

Courses	SLOs	SLO 1	SLO 2	SLO 3	SLO 4
BIOL 493	Lab Teaching Practicum				
BIOL 487	Advanced Research		X	X	X
*BIOL 483	Senior Thesis			X	X
BIOL 482	Senior Research			X	X
BIOL 450/450L	Mycology	X		X	X
BIOL 442	Pharmacology	X			
BIOL 441	Endocrinology	X		X	
BIOL 433	Marine Invert Communities	X		X	X
BIOL 431/431L	Animal Parasitology	X	X		
BIOL 426/426L	Intro to Electron Microscopy	X			
BIOL 425	Molecular Genetics	X		X	
BIOL 423/423L	Plant Anatomy	X		X	X
BIOL 421/421L	Plant Physiology	X	X	X	X
BIOL 418/418L	Wildlife Mgmt/Fld Tech	X	X		
BIOL 316/316L	Animal Behavior (Ethology)	X	X		
BIOL 415	Tropical Ecosystems	X			
BIOL 414/414L	Freshwater (Aquatic Biology)	X	X		
BIOL 413/413L	Herpetology	X	X		
BIOL 412/412L	Ornithology	X	X		
BIOL 411/411L	Mammalogy	X	X		
BIOL 410/410L	Human Osteology	X			
BIOL 409/409L	Gross Dev and Human Anatomy	X			
BIOL 408	Desert Ecology	X			
BIOL 406	Plant-Animal Interactions	X			
BIOL 405/405L	Advanced Ecological Methods	X	X		
BIOL 403	Evolution	X	X	X	X
BIOL 387	Structured Research			X	X
BIOL 371L	Lab Invest in Cell and Molec Biol	X	X	X	X
BIOL 350/350L	Microbiology	X	X		
BIOL 344/344L	Forensic Molecular Biology	X	X		
BIOL 343	Immunology	X		X	
BIOL 342/342L	Histology	X			
BIOL 341/341L	General Physiology	X	X		X
BIOL 336	Fish Biology	X			
BIOL 335/335L	Invertebrate Zoology	X		X	X
BIOL 333	Marine Biology	X		X	X
BIOL 331/331L	Insect Biology	X			
BIOL 322/322L	Plant Identification	X		X	
BIOL 321/321L	Taxonomy of Grasses	X		X	X
BIOL 320	Plant Systematics	X		X	X
BIOL 315	Epidemiology	X			
BIOL 310/310L	Developmental Biology	X	X	X	X
BIOL 302	Cellular Biology	X			
*BIOL 301/301L	Principles of Genetics	X	X	X	
BIOL 250/250L	Intro to Medical Microbiology	X	X		
BIOL 241	Pathophysiology	X		X	
BIOL 211/211L	Ecosystem Biology	X			
BIOL 210/210L	Human Anat. and Physiol. II	X			
BIOL 209/209L	Human Anat. and Physiol.	X			
*BIOL 208/208L	Fundamentals of Ecol. Evol.	X			
BIOL 108/108L	Diversity of organisms	X			
BIOL 107/107L	Principles of Plant Biology	X		X	X

BIOL 106/106L	Principles of Animal Biology	X			
*BIOL 105/105L	Attributes of Living Systems	X	X		X
CMU Biology Graduates will be able to...					
1) Students will demonstrate a broad, comprehensive knowledge of the main areas of biology (including evolution, and the ability to apply this knowledge to address new questions.					
2) Students will demonstrate the ability to use science as a way of thinking and problem solving. They will be able to formulate hypotheses, design experiments, collect and analyze data, draw logical conclusions and explain and defend					
3) Students will demonstrate the ability to critically search, read, evaluate and discuss primary literature.					
4) Students will demonstrate effective biological communication skills, both in writing					
*Required core courses					

Appendix F

Alumni Survey Results and Exit Survey from Graduating Seniors

Alumni Survey Results for Biology Graduates - 2019

(n = 69)

Overall, how satisfied are you with your undergraduate education?

	#	%
Very Satisfied	20	29.0%
Generally Satisfied	36	52.2%
Ambivalent	10	14.5%
Generally Dissatisfied	2	2.9%
Very Dissatisfied	1	1.4%

While an undergraduate, about how often did you have conversations with faculty outside of class?

	#	%
Never	0	0.0%
Rarely (1-2 times per semester)	9	13.0%
Occasionally (3-5 times per semester)	23	33.3%
Often (once every two weeks)	12	17.4%
Very Often (at least once a week)	25	36.2%

Would you encourage a current high school senior to attend CMU?

	#	%
Definitely Would	32	46.4%
Probably Would	24	34.8%
Maybe	10	14.5%
Probably Would Not	1	1.4%
Definitely Would Not	2	2.9%

In what year did you graduate from the major/certificate you chose above?

	#	%
2018	10	14.5%
2017	11	15.9%
2016	18	26.1%
2015	14	20.3%
2014	7	10.1%
2013	7	10.1%
Other	2	2.9%

How would you rate the overall quality of your education within that degree/certificate program?

	#	%
Very High	13	18.8%
High	36	52.2%
Average	20	29.0%
Low	0	0.0%
Very Low	0	0.0%

Which Biology degree did you receive from CMU?

	#	%
A.S. Biology	6	8.7%
B.S. Biology	53	76.8%
B.S. Biology, Secondary Education	2	2.9%

B.S. Cellular, Molecular, and Developmental Biology	2	2.9%
B.S. Ecology, Evolution and Organismal Biology	6	8.7%

If Colorado Mesa University offered a Master's Degree in Biology, what would your interest level be in that program?

	#	%
1-No Interest in Enrolling	24	35.3%
2	4	5.9%
3	5	7.4%
4	20	29.4%
5-Highly Interested in Enrolling	15	22.1%

If you are interested in pursuing a Master's degree at CMU, would you prefer being a full-time or part-time student?

	#	%
Full-Time	24	42.1%
Part-Time	33	57.9%

What reason(s) do you have for pursuing a Master's degree in Biology? (select all that apply)

	# of Times Checked	% (n=69)
Personal growth and development	28	40.6%
To pursue professional school	11	15.9%
To prepare for further graduate education	14	20.3%
To work towards a promotion in current job	18	26.1%
To be able to make more money in current job	18	26.1%
To enter a new career	20	29.0%
Other	8	11.6%

Other Responses:

- ☞ To return to the Disney College Program and attempt to find a career through their internship programs.
- ☞ To hopefully be competitive in the job market
- ☞ To focus my education in such a broad field
- ☞ to find more jobs available with this degree
- ☞ To actually get a job in a career that pays decent and not min. Wage
- ☞ Specialized learning in a specific field
- ☞ Interesting in a Master in Social Work, focused in therapy
- ☞ Gain much needed experience to obtain a job

In which field of biology are you interested?

	#	%
Biomedical/Cellular and Molecular Biology Research	27	39.1%
Fisheries and Wildlife/Natural Resource Management	9	13.0%

Ecology and Evolution	5	7.2%
Forensics	6	8.7%
Other	8	11.6%

Other Responses:

- ☞ Water Treatment
- ☞ Teaching
- ☞ Medicine
- ☞ Medical
- ☞ I would like to become a Licence in Mental health therapy
- ☞ brewing
- ☞ All of the above except biomedical/cellular and molecular biology research.
- ☞ All

What do you want to do after you receive your Master's degree?

- ☞ Would not be interested in a masters in biology alone- it's a pretty worthless stand alone degree. More interested in pursuing a professional masters like physican assistant.
- ☞ work for the federal Gov and try to make my own practice
- ☞ Work and pursue further education
- ☞ Work
- ☞ Teach or get into field work.
- ☞ Teach High school and be a director for STEM programs
- ☞ Teach at a high level
- ☞ start my career
- ☞ Obtain a career
- ☞ New career
- ☞ Make discoveries and money
- ☞ Join the medical field.
- ☞ It's nothing personal, I just don't e er want to be in Colorado again. Cmu was great though
- ☞ Ideally work in research and teach.
- ☞ I'm hoping to go to graduate school soon, possibly the PA program at CMU.
- ☞ I would like to further my education towards a PhD
- ☞ I do not want a masters in biology. There is no work locally for biology degrees.
- ☞ I am currently working towards my Masters in Physician Assistant Studies
- ☞ I already have a Masters Degree from another school and I am already in a full time career.
- ☞ Hopefully find a job- unable to do so after a B.S.
- ☞ Have a meaningful career.
- ☞ go to optometry school
- ☞ Go further in the field of forensic science
- ☞ Get my doctorate
- ☞ Fisheries research biologist
- ☞ Find a nice job
- ☞ Environmental management/ecological restoration
- ☞ Entomologist in a forensic field.
- ☞ Enter a career in biology that will provide a secure and safe place for me. I would prefer to do this either in Colorado or through the Walt Disney Company. I want to be able to afford a house, settle down, and not have to move across the country for every little part-time/seasonal/internship that pops up. I want to be able to make money and have health insurance and a retirement.
- ☞ Create management plans for endangered species
- ☞ Continue working in pharmaceutical research and development.
- ☞ Continue teaching
- ☞ Continue my career in water treatment
- ☞ Continue making wine and travel.
- ☞ Career in forensics is the ultimate goal but CMU doesn't have what I'm looking for currently.
- ☞ Become a terrestrial wildlife biologist for a state or federal land/ natural resources management agency.

What are your career objectives?

- ☞ You guys offer a program for undergrads interested in the water industry. It would be great if CMU offered a graduate level certificate or degree
- ☞ Work in medicine
- ☞ Work in medical laboratory science
- ☞ Win
- ☞ Wildlife biologist, wildlife disease ecologist
- ☞ To move toward a career in forensic science in the criminal justice field.
- ☞ To help with Public Health
- ☞ To continue moving up in the medical field and keep learning as I go.
- ☞ To continually grow my knowledge in my current field. I'll see what else flows my way.
- ☞ to become a doctor
- ☞ To attain permanent employee status with a land/ management agency that fosters continued learning and challenges, while making enough income to pay back student debt and live free of worry of keeping a roof over our heads and food on the table.
- ☞ Teach at primary level for a time and move to secondary. I would like to teach AP biology classes. In addition, be involved with STEM projects to move up.
- ☞ Program Management
- ☞ Physician assistant
- ☞ PhD.
- ☞ PhD
- ☞ Pay off student debt...
- ☞ PA
- ☞ PA
- ☞ Not in a biology related career due to a chronic illness
- ☞ Mentor a few students in plant genetics research and teach undergraduate classes
- ☞ Medical.
- ☞ medical profession
- ☞ MD/PhD in clinical sciences
- ☞ Keep on keeping on. There is nothing else.
- ☞ I would like to work at an university doing research and teaching
- ☞ I would like to be a teacher in some capacity and help spread science.
- ☞ I am not interested because I am currently enrolled (half way through) at Palmer college of chiropractic for my DC
- ☞ I am currently in medical school pursuing my doctorate in Osteopathic medicine. My goal at this time is to become a dermatologist or a specialized pediatric physician.
- ☞ Higher progression into R&D in a pharma lab, focusing on cell/gene therapy or biologics.
- ☞ Get a job that provides me with good health insurance and retirement so that I can live.
- ☞ Forensic investigation.
- ☞ Forensic Entomology, continue in death investigation
- ☞ Fish Health Research Biologist
- ☞ Find a worthy career that has something to do with my degree.
- ☞ Environmental law.
- ☞ Currently enrolled in a ABSN program for gero-pysch nurse
- ☞ bring or start a company to a high caliber multi national company.
- ☞ Become a physician
- ☞ Become a doctor
- ☞ be able to get my master and license before I turned 45 years old
- ☞ After finishing my PhD, to run my own research program and teach at the university and graduate level

Associate Student Learning Outcomes

Based on what you know now, how well do you think your undergraduate experience prepared you to:

	Very Well		More than Adequately		Adequately		Less Than Adequately		Very Poorly	
	#	%	#	%	#	%	#	%	#	%
Locate, gather and organize evidence on an assigned topic addressing a course or discipline-related question or a question of practice in a work or community setting (Specialized Knowledge/Applied Learning)	1	16.7%	4	66.7%	1	16.7%	0	0.0%	0	0.0%
Use program-level mathematical concepts and methods to understand, analyze, and explain issues in quantitative terms (Intellectual Skills: Quantitative Fluency)	1	16.7%	4	66.7%	1	16.7%	0	0.0%	0	0.0%
Make and defend claims in a well-organized, professional document and/or oral presentation that is appropriate for a specific audience (Intellectual Skills: Communication Fluency)	1	20.0%	4	80.0%	0	0.0%	0	0.0%	0	0.0%
Identify and gather the information/data relevant to the essential question, issue and/or problem and develop informed conclusions (Intellectual Skills: Critical Thinking)	2	40.0%	3	60.0%	0	0.0%	0	0.0%	0	0.0%

Baccalaureate Student Learning Outcomes

Based on what you know now, how well do you think your undergraduate experience prepared you to:

	Very Well		More than Adequately		Adequately		Less Than Adequately		Very Poorly	
	#	%	#	%	#	%	#	%	#	%
Construct a summative project, paper or practiced-based performance that draws on current research, scholarship and/or techniques, and specialized knowledge in the discipline (Applied Learning/ Specialized Knowledge)	19	30.2%	19	30.2%	22	34.9%	3	4.8%	0	0.0%
Analyze data critically, reason logically, and apply quantitative analysis methods correctly to develop appropriate conclusions (Intellectual Skills: Quantitative Fluency)	23	37.1%	15	24.2%	23	37.1%	1	1.6%	0	0.0%
Make and defend assertions about a specialized topic in an extended well-organized document and an oral presentation that is appropriate to the discipline (Intellectual Skills: Communication Fluency)	20	31.7%	21	33.3%	18	28.6%	4	6.3%	0	0.0%

Identify assumptions, evaluate hypotheses or alternative views, articulate implications and formulate conclusions (Intellectual Skills: Critical Thinking)	22	34.9%	21	33.3%	19	30.2%	1	1.6%	0	0.0%
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Job and Career Questions

Are you working for pay right now?

	#	%
Yes, full-time	51	73.9%
Yes, part-time	5	7.2%
No	13	18.8%

Only respondents who answered "Yes" they are working for pay right now answered the following questions.

In what type of organization is your principal employment? Mark the one best answer.

Self-employed in own business or professional non-group practice	2
Private for-profit corporation/company/group/group-practice	19
Higher education (public or private)	3
Elementary or secondary education (public or private)	6
International organization in the US	1
International organization outside of the US	0
US Military	0
Federal Government (except military)	3
State and local government, institution, or agency (except education)	7
Private non-profit organization (except education and international organizations)	6
Other	7

Other Responses: Funeral Home, Hospital, LLC, Mesa County Criminal Justice Department, Retail, School district custodian, Waitress

Job and Career Questions (continued)

Which of the following best describes your current position?

	#	%
Entry Level	24	42.9%
Mid-Level	28	50.0%
Senior Level	4	7.1%
Executive Level (except for chief executive)	0	0.0%
Chief Executive (CEO, COO, CFO, GM or principal in a business of other organization)	0	0.0%

How many years have you been in your current job type?

	#	%
Less than 3 years	37	66.1%
3-5 years	15	26.8%
6-9 years	3	5.4%
10 or more years	1	1.8%

Is your current position related to your CMU field(s) of study?

	#	%
Yes, related to major(s)	34	61.8%
No, not related	21	38.2%

How well did CMU prepare you for your current career?

	#	%
Very Well	6	10.7%
More than Adequately	16	28.6%
Adequately	22	39.3%
Less Than Adequately	2	3.6%
Very Poorly	5	8.9%
NA	5	8.9%

What is your approximate annual gross income (before taxes)?

	#	%
Under \$20,000	6	12.0%
\$20,000 - \$29,999	9	18.0%
\$30,000 - \$39,999	14	28.0%
\$40,000 - \$49,999	8	16.0%
\$50,000 - \$59,999	9	18.0%
\$60,000 - \$74,999	2	4.0%
\$75,000 - \$99,999	2	4.0%
\$100,000 - \$149,999	0	0.0%
\$150,000 - \$249,999	0	0.0%
\$250,000 - \$499,999	0	0.0%
Over \$500,000	0	0.0%

Job and Career Questions (continued)

Comments about your work experience that will help improve CMU:

- ☞ This job is temporary. Permanent positions in biology are hard to come by, especially in macro-biology. You need to tell students to either be prepared to go to grad school right away or to get a second degree in something that actually has jobs. There are not a lot of f jobs anywhere. You need to tell them that they should be ready to work part-time in retail or fast food for a long time, or for forever.
- ☞ The Thesis course and the research credits I completed were the most helpful in my degree at CMU regarding my current career.
- ☞ Sometimes at work I felt that I had less exposure to technical skills and field time as compared to someone who graduated from, say, CSU. It would be great if CMU could expand the practical skills and field time portions of the biology program (although I know it's already grown since I attended CMU).
- ☞ Since graduating from CMU I have worked as an interpreter for CPW, a veterinary assistant, and as a biodiversity ranger for the Department of Conservation in New Zealand. I would say that my education through CMU is what allowed me to acquire each of those positions however, I do not feel that I was adequately taught statistics for ecological sciences. This background would have been helpful when applying for other positions.
- ☞ Place a higher focus on what careers are possible through a given degree. Some professors are really good at this but it took me a while to find the job I currently have because I didn't know what all was out there and what I could be applying for.
- ☞ most of my practices are self taught. doing dilutions, yeast cell counting, making augers, and streaking plates would have been very beneficial.
- ☞ More knowledge of how the degrees can be used outside of college.
- ☞ More career advising. I've built a wonderful career and utilize my degree. However I never knew a career in water was possible until I stumbled upon the industry by accident
- ☞ Make the classes harder. Just because Mesa isn't a prestigious university doesn't mean the faculty can't create adequately difficult classes on the level of top universities.
- ☞ I worked full time and did school full time and have nothing to show for it besides a piece of paper. I did unpaid internships for experience and no employer will give me a chance. I was told to apply for over 500 positions before I complain, but I'm a college graduate making \$24,000 a year cleaning schools. I've had many people look at my resume and update it and still no luck. There needs to a be better program for college graduates to earn employment in their fields in a town that has a university.

- ☞ I work in Social Services start as HIV Case manager in Colorado than Family Coach for DHS Oregon Portland and Currently I am Case Manager 2 Aging and Disability at Multnomah County Portland Oregon all my education help me hold all these positions and created a career path.
- ☞ I guess free college in general.
- ☞ I did not have sufficient technical, analytical skills.
- ☞ I am currently using my CNA license more than my biology degree.
- ☞ I am a middle school science teacher.
- ☞ CMU did not prepare me for finding a career after graduation. I was lucky to find a lab job at a wastewater facility but it is not the career I set out to obtain.
- ☞ classes don't prepare you for the workforce, internships and experience in the field do. Knowing this would have better prepared me for a career in my field. Since this didn't happen, I haven't been able to use my degree,
- ☞ Although I am not working in my field of study, I did not search for work immediately after graduating (I took care of personal matters). However, I am currently seeking employment and have so far had some promising interviews. I know I have learned the necessary skills in order to be successful.
- ☞ After getting my degree, I found the job market was extremely competitive in my field and there honestly was not much opportunity. I ended up going to work for the US Forest Service in an entirely different program than was related to my field and now have been unable to get into a wildlife program despite experience with CDOW during summers of college. It has been extremely frustrating to be unable to work in the field that I am truly passionate about.

Only respondents who answered "No" they are not working for pay right now answered the following question:

Why are you not currently working for pay? (Please mark all that apply)

	# of times checked
I chose not to enter the workforce at this time.	1
It has been difficult to find a position in my field.	2
It has been difficult to find a position paying an appropriate salary.	1
I am raising a family.	0
I am currently a student.	7
I am doing volunteer work.	0
I am retired.	0
Other	4

Other Responses

- ☞ Enrolled in doctorate program
- ☞ Current student working towards my DC
- ☞ Moved to support parents. Before the move I had a pretty sweet lab tech gig.
- ☞ Working a job that pays for my living

If you have comments about previous employment, work experience, or job hunting that will help improve CMU, please leave them here:

- ☞ Could not find a job what so ever with the degree after graduating.
- ☞ Entering Medical School

Education since College

Have you enrolled in a graduate, professional, or other degree/certificate program since graduating from CMU?

	#	%
Yes	27	39.1%
No	25	36.2%
No, but I plan to enroll in the next two years.	17	24.6%

Only respondents who answered "Yes" I have enrolled in another degree/certificate program since graduating from CMU answered the following questions.

Are you enrolled in this program now?

	#	%
Yes, I am a full-time student	16	59.3%
Yes, I am a part-time student	4	14.8%
No	7	25.9%

How long after you graduated from the degree/certificate program this survey pertains to did you start this program?

	#	%
Immediately (following fall or spring)	6	22.2%
1 Year later	10	37.0%
2-3 years later	9	33.3%
4-6 years later	1	3.7%
NA	1	3.7%

Altogether, how many years have/did you attend(ed) further schooling? Mark the best answer.

	#	%
None	0	0.0%
1 - 2 years	15	57.7%
3 - 4 years	6	23.1%
5 - 6 years	2	7.7%
NA	3	11.5%

Education since College (continued)

How well did CMU prepare you for this educational program?

	#	%
Very Well	7	25.9%
More than Adequately	6	22.2%
Adequately	11	40.7%
Less Than Adequately	2	7.4%
Very Poorly	1	3.7%
NA	0	0.0%

What level of education are/were you pursuing?

	#	%
Certificate	3	11.1%
Associate	1	3.7%
Baccalaureate	2	7.4%
Post-Bacc Certificate	0	0.0%
Master's	10	37.0%
J.D.	0	0.0%
Doctoral	11	40.7%
Other	0	0.0%

In which field and program are/were you studying and what is the name of the College/University you attend(ed)?

College/University	Field Studying	Level Pursing
Western	Education	Masters
University of Otago	MS in Wildlife Management	Masters

☞ University of Idaho	Bioinformatics and Computational Biology (Ecology and Evolution)	Doctoral
☞ University of Colorado	Medicine	Doctoral
☞ UC Davis	Horticulture and agronomy	Doctoral
☞ South Dakota School of Mines	Chemical Engineering	Masters
☞ Ross University school of medicine	Medical school (MD)	Doctoral
☞ Regis University	Pharmacy	Doctoral
☞ Red Rocks Community College	Physician's Assistant	Masters
☞ Platt college	Registered veterinary technician	Certificate
☞ Palmer College of Chiropractic Port Orange	Chiropractic	Doctoral
☞ Nova Southeastern University	Physician Assistant	Masters
☞ Midwestern University	Veterinary medicine	Doctoral
☞ Metro State University	Japanese	Certificate
☞ Liberty University College of a Osteopathic Medicine	Doctorate of Osteopathic Medicine	Doctoral
☞ Kansas City University	Medical school	~a D.O. degree
☞ Idaho College of Osteopathic Medicine	Medicine	Doctoral
☞ Creighton University	MD/PhD in Biomedical Sciences	Doctoral
☞ Colorado School of Public Health	Public Health	Masters
☞ Colorado Mesa University	Education	Masters
☞ Colorado mesa University	Environmental sciences	Baccaluateate
☞ Colorado Mesa	Education	Masters
☞ Colorado Christian University	Teaching license	Masters
☞ CMU	Medical Lab technology	Associate

Education since College (continued)

Did you complete this program?

	#	%
Yes	5	18.5%
No	2	7.4%
In the process of finishing	20	74.1%

Other comments about furthering your education:

- ☞ My undergraduate research experience was integral to my success as a graduate student. At CMU, taking classes outside of my specified program, esp in math, made a huge difference in my preparedness for my graduate program.
- ☞ It worked better for me pursue an alternative license for teaching because I couldn't afford not to work.
I'm in the transition between working full time at a hospital and starting medical school
I feel like having a MCAT prep course would be highly advantageous for those pursuing a similar field as mine. I also feel some of the hardest things I have found adjusting to medical school is the volume (my first year of medical school I took 54 credits and my second one is 46 with board studies on top of that) and the types of questions asked. They do not do first order questions (if patient presents with bloody diarrhea and gram negative stained cultures, what is likely to be the infectious agent? Answer: E. coli) but rather 2nd, 3rd, and 4th order questions (patient presents with bloody diarrhea and recently traveled to Mexico. What would be the gram stain of the infectious agent? Answer: Gram negative Rods). If CMU could incorporate more complex questions that aren't first order that would be very helpful.

Suggestions for improving the degree/certificate program:

- ☞ What professional certifications are available in biology? Maybe a quick look at what is out there would be helpful.
- ☞ There really isn't much guidance for the medical school track/applications/preparation within the Biology Department. This would be really helpful for medical school hopefuls.
- ☞ The staff during my tenure at CMU was amazing. They truly are what made me feel as though I got a top tier program. Unfortunately, I am unaware as to whether many of them are still educating there. I honestly feel like the CMU couldn't have provided them with more support in my time, as I feel some were a bit underappreciated.
- ☞ See previous response. 1. MCAT prep 2. 2nd, 3rd, and 4th order questions 3. Study skills for doctoral programs (topic course maybe?)
- ☞ none
- ☞ My main suggestion would be to add a statistics course that is directly related to ecology/biology/zoology. When starting my masters degree I was required to take an undergraduate statistics course in ecology as the statistics course from CMU did not transfer. I do not feel that the statistics course I took at CMU helped me with the course that I took at my current university as we did not learn how to use any type of statistical software such as SPSS or R. The statistics course offered by CMU is very generalized and hardly came in handy while learning statistical analysis for ecology.
- ☞ More medical based curriculum in place of general biology for pre-PA/ pre-med students
- ☞ More easy to find job help during senior year
- ☞ More classes specific to wildlife. Wildlife internship courses with BLM, DOW would make for an easier transition.
- ☞ More advanced Microbiology and epidemiology classes and labs
- ☞ Make the classes harder
- ☞ Make Geographic Information Systems a suggested course for people pursuing a biology degree focused on fish/wildlife/ecology.
- ☞ Make CMU's housing department follow the ADA so I don't have to threaten to file a law suit.
- ☞ Keep class sizes small. Maintain/increase professor/student relations. Push students to internship/research opportunities in their interests.
- ☞ I thought the program was very good. I would suggest mandatory meetings with counselors semiannually. To avoid confusion and provide more mentorship within the field
- ☞ I think the bio department adequately preps individuals however they skip over some basic biological practices that should be taught. Such as: pouring agar plates, streaking colonies correctly. cell counting etc.
- ☞ I really think CMU would benefit from having more options in graduate programs in biological studies.
- ☞ Help students get jobs right out of college or prepare them to be unemployed. Prepare them for temp work for the next decade and teach them how to get health insurance and start a retirement when they don't have a permanent position in a field. Warn students that jobs are nearly impossible to keep and that they will likely need to move in order to find temp jobs. Warn female students that the job field is heavily male-dominated.
- ☞ Have involved advisors that require meetings and schedule sit downs to go over the degree program and best options.
- ☞ Excellent program, place higher focus on what careers are possible with a bio degree (e.g., I work for a DOE contractor that does radiological and environmental monitoring
- ☞ CMU students would be well-served if more empirical data analysis were incorporated starting at 100- level classes. Although I think the senior research paper is a valuable experience, a senior project like that in Environmental Science would provide students the opportunity to build professional skills and network.
- ☞ CMU really needs more pre-med support and guidance! My advisor (Aparna) was fantastic, but I believe she's now going into administration
- ☞ Better preparation for entry exams into graduate programs (MCAT, LSAT, etc)
- ☞ Better help with finding students careers in that field after college.
- ☞ Allowing for more internship credits to allowed to have proper qualifications when applying for jobs after finishing the bachelor's program
- ☞ Add more specialized programs, teach to prepare for specific career paths if possible.
- ☞ a prep course for taking the gre, mcats or the oac and a building block class leading up to senior thesis.

Additional Comments:

- ☞ It has been 7 years since Mesa has become a university. It's about time they start introducing some masters and PhD degrees for wildlife and other courses.
- ☞ I value my education from CMU but it was the worst decision (financially) I could have made. I have a huge student debt bill with no quality jobs available that allow for significant payback of the loans. Can't finance a house, can't finance a car... debt to income ratio too high.

- ☞ I think post grad success obviously depends on the individual . Some students should be in trade schools and not a trad 4 year degree program. All the opportunities to get experience and funding are available through Mesa and this program, but itâ€™s up to the individual to follow through. I as a mediocre student with little study discipline, poor ACT score, and low HS gpa would have probably done better getting a trade.
- ☞ I loved my time in the Biology department at CMU. I just think that the sciences are pushed too much for how little jobs there actually are. You need to better warn students that they will not be getting jobs right away or that they will be working temp jobs for probably a decade. You might even suggest to them to get a second degree that actually has jobs like in business, even if it doesn't interest them. There is not a lot out here and everything requires experience that we didn't get at CMU or at any temp job.
- ☞ I loved my time at CMU. There are so many advantages to going to a smaller university!
- ☞ I am not aware of current tuition rates, but it also seemed that every year during my time at CMU there was a tuition hike. For, non trads, a lot of the improvements that occur were of very little impact to us. I hope the trend did not continue and tuition is still reasonable to attend what was once a very affordable, small , but well respected institution of higher education.
- ☞ Getting into medical school was SO tedious and extra challenging because of the lack of pre-med guidance! Please improve this for future pre-med students! I learned so many things about the application process the hard way! Please oh please work on this!
- ☞ Based on my experience and what I have heard from others who are in my field but have gone to different schools, the dedicated faculty really made all the difference. I got experiences that no one else even knew about. Plus I have a good relationship with my professors which helps in such a competitive field.
- ☞ As a first gen student, I am so grateful for the pivotal role CMU had in helping me shape my future.
- ☞ All of my labs always seemed rushed...give more available time...

Demographic Questions

What is your gender?

	#	%
Male	30	43.5%
Female	39	56.5%
Prefer not to respond	0	0.0%

What is your ethnicity?

	#	%
American Indian or Alaskan Native	1	1.4%
Asian	0	0.0%
Black or African American	0	0.0%
Hispanic of any race	6	8.7%
Native Hawaiian or Pacific Islander	0	0.0%
White	56	81.2%
Two or more races	2	2.9%
Race and ethnicity unknown	0	0.0%
Non-Resident Alien (of any race or ethnicity)	0	0.0%
Prefer not to respond	3	4.3%
Other	1	1.4%

What is your current age?

	#	%
Under 21	0	0.0%
21-24	17	24.6%
25-34	44	63.8%
35-44	5	7.2%
45-54	1	1.4%
55 or older	0	0.0%
Prefer not to respond	2	2.9%

Do you live in the state of Colorado?

	#	%
Yes	45	65.2%
No	24	34.8%

If yes, do you live in Western Colorado?

	#	%
Yes	29	43.9%
No	37	56.1%

CMU Alumni Survey Results - Combined 2013-2019

n=778

Year of survey

Year	#	%
2013	38	4.9%
2014	68	8.7%
2015	127	16.3%
2016	187	24.0%
2017	73	9.4%
2018	158	20.3%
2019	127	16.3%

Overall, how satisfied are you with your undergraduate education?

	#	%
Very Satisfied	349	45.2%
Generally Satisfied	358	46.4%
Ambivalent	40	5.2%
Generally Dissatisfied	19	2.5%
Very Dissatisfied	6	0.8%

While an undergraduate, about how often did you have conversations with faculty outside of class?

	#	%
Never	24	3.1%
Rarely (1-2 times per semester)	97	12.5%
Occasionally (3-5 times per semester)	184	23.7%
Often (once every two weeks)	178	23.0%
Very Often (at least once a week)	292	37.7%

Would you encourage a current high school senior to attend CMU?

	#	%
Definitely Would	469	60.5%
Probably Would	210	27.1%
Maybe	73	9.4%
Probably Would Not	12	1.5%
Definitely Would Not	11	1.4%

How would you rate the overall quality of your education within that degree/certificate program?

	#	%
Very High	284	36.5%
High	341	43.8%
Average	130	16.7%
Low	18	2.3%
Very Low	5	0.6%

Job and Career Questions

Are you working for pay right now?

	#	%
Yes, work full-time	611	78.5%
Yes, work part-time	85	10.9%
No	82	10.5%

Only respondents who answered "Yes," they are working for pay right now, answered the following questions.

In what type of organization is your principal employment? Mark the one best answer.

Self-employed in own business or professional non-group practice	35
Private for profit corporation/company/group/group-practice	242
Higher education (public or private)	50
Elementary or secondary education (public or private)	86
International organization in the US	15
International organization outside of the US	6
US Military	7
Federal Government (except military)	25
State and local government, institution, or agency (except education)	87
Private non-profit organization (except education and international organizations)	86
Other -	41

Other - 501c6 & 501c3 organization, Archery company, Banking, Corporate Mortgage Company, Internet Marketing, Oil & Gas Industry, Restaurant, Work for higher education, physical labor, Research Assistant, special district, Trucking...

Which of the following best describes your current position?

	#	%
Entry Level	250	36.3%
Mid-Level	331	48.0%
Senior Level	79	11.5%
Executive Level (except for chief executive)	12	1.7%
Chief Executive (CEO, COO, CFO, GM or principal in a business of other organization)	13	1.9%
Graduate Assistantship	4	0.6%

How many years have you been in your current job type?

	#	%
Less than 3 years	452	65.1%
3-5 years	172	24.8%
6-9 years	40	5.8%
10 or more years	30	4.3%

Is your current position related to your undergraduate field(s) of study?

	#	%
Yes, related to major(s)	520	75.1%
No, not related	172	24.9%

Job and Career Questions (continued)

How well did CMU prepare you for your current career?

	#	%
Very Well	177	25.7%
More than Adequately	198	28.7%
Adequately	240	34.8%
Less Than Adequately	27	3.9%
Very Poorly	15	2.2%
NA	32	4.6%

What is your approximate annual gross income (before taxes)?

	#	%
Under \$20,000	46	7.5%
\$20,000 - \$29,999	83	13.5%
\$30,000 - \$39,999	143	23.2%
\$40,000 - \$49,999	111	18.0%
\$50,000 - \$59,999	94	15.3%
\$60,000 - \$74,999	67	10.9%
\$75,000 - \$99,999	47	7.6%
\$100,000 - \$149,999	19	3.1%
\$150,000 - \$249,999	3	0.5%
\$250,000 - \$499,999	2	0.3%
Over \$500,000	1	0.2%

Only respondents who answered "No," they are not working for pay right now, answered the following question.

Why are you not currently working for pay? (Please mark all that apply)

	# of times checked
I chose not to enter the workforce at this time.	9
It has been difficult to find a position in my field.	24
It has been difficult to find a position paying an appropriate salary.	15
I am raising a family.	16
I am currently a student.	44
I am doing volunteer work.	6
I am retired.	4
Other	32

Education since College

Have you enrolled in a graduate, professional, or other degree/certificate program since graduating from CMU?

	#	%
Yes	241	31.0%
No	367	47.2%
No, but I plan to enroll in the next two years.	170	21.9%

Only respondents who answered "Yes" I have enrolled in another degree/certificate program since graduating from CMU answered the following questions.

Are you enrolled in this program now?

	#	%
Yes, I am a full-time student	102	42.5%
Yes, I am a part-time student	32	13.3%
No	106	44.2%

How long after you graduated from the degree/certificate program this survey pertains to did you start this program?

	#	%
Immediately (following fall or spring)	111	46.1%
1 Year later	51	21.2%
2-3 years later	59	24.5%
4-6 years later	15	6.2%
NA	5	2.1%

Altogether, how many years have/did you attend(ed) further schooling? Mark the best answer.

	#	%
None	15	6.3%
1 to 2 years	141	59.2%
3 to 4 years	59	24.8%
5 to 6 years	15	6.3%
NA	8	3.4%

How well did CMU prepare you for this educational program?

	#	%
Very Well	87	36.3%
More than Adequately	67	27.9%
Adequately	64	26.7%
Less Than Adequately	9	3.8%
Very Poorly	4	1.7%
NA	9	3.8%

Education since College (continued)

What level of education are/were you pursuing?

	#	%
Certificate	19	8.0%
Associate	12	5.1%
Baccalaureate	25	10.5%
Post-Bacc Certificate	5	2.1%
Master's	118	49.8%
J.D.	19	8.0%
Doctoral	39	16.5%
Other	0	0.0%

Did you complete this program?

	#	%
Yes	85	35.7%
No	19	8.0%
In the process of finishing	134	56.3%

Demographic Questions

What is your gender?

	#	%
Male	307	39.9%
Female	446	57.9%
Prefer not to respond	17	2.2%

What is your ethnicity?

	#	%
American Indian or Alaskan Native	11	1.4%
Asian	13	1.7%
Black or African American	6	0.8%
Hispanic of any race	50	6.5%
Native Hawaiian or Pacific Islander	4	0.5%
White	618	80.5%
Two or more races	28	3.6%
Race and ethnicity unknown	1	0.1%
Non-Resident Alien (of any race or ethnicity)	1	0.1%
Prefer not to respond	30	3.9%
Other	6	0.8%

Demographic Questions (continued)

What is your current age?

	#	%
Under 21	7	0.9%
21-24	191	24.7%
25-34	413	53.4%
35-44	91	11.8%
45-54	39	5.0%
55 or older	18	2.3%
Prefer not to respond	14	1.8%

Do you live in the state of Colorado?

	#	%
Yes	574	74.3%
No	199	25.7%

If yes, do you live in Western Colorado?

	#	%
Yes	416	57.7%
No	305	42.3%

Biological Sciences Graduation Exit Survey

Colorado Mesa University

In order for us to evaluate and improve our program delivery, please take a few moments to fill out the survey below and return it to the Chair of the Biology Department (WS 228G) or the Administrative Assistant (WS232). You do not need to put your name on the survey. If you wish to mail the form back, the address is

Chair, Biological Sciences
Colorado Mesa University
1100 North Avenue
Grand Junction, CO 81501-3122

1. What is your major?
 BS in Biological Sciences
 BS in Biological Sciences – Cellular, Molecular, Developmental
 BS in Biological Sciences – Ecology, Evolution, Organismal
 BS in Biological Sciences – Secondary Teacher Certification
 AS in Biological Sciences
2. What is your sex (optional)?
 female
 male
3. What was your class standing when you entered the biology program at CMU?
 Freshman (first time)
 Freshman (transfer)
 Sophomore
 Junior
 Senior
4. Have you primarily been a full-time or part-time student?
 full-time
 part-time
5. While at CMU, during the academic semesters did you work outside of school
 mostly part-time?
 mostly full-time?
 intermittently?
 not at all?
6. How much difficulty did you have financing your studies at CMU?
 no difficulty
 some difficulty
 great difficulty
7. Which best describes your post-graduation plans?
 job related to biology
 graduate school (Masters or PhD) or professional school (MD, DVM, etc.)
 job not related to biology
 military
 teaching

8. Please rate the criteria below based on your experiences in Biology at CMU.

8.1 Availability of Biology classes

- very satisfied
- somewhat satisfied
- neither satisfied nor dissatisfied
- somewhat dissatisfied
- very dissatisfied

8.2 Availability of Physical Sciences classes

- very satisfied
- somewhat satisfied
- neither satisfied nor dissatisfied
- somewhat dissatisfied
- very dissatisfied

8.3 Usefulness of texts and course materials

- very satisfied
- somewhat satisfied
- neither satisfied nor dissatisfied
- somewhat dissatisfied
- very dissatisfied

8.3 Access to faculty

- very satisfied
- somewhat satisfied
- neither satisfied nor dissatisfied
- somewhat dissatisfied
- very dissatisfied

8.5 Content and structure of the major

- very satisfied
- somewhat satisfied
- neither satisfied nor dissatisfied
- somewhat dissatisfied
- very dissatisfied

8.6 Quality of advising about coursework in your major

- very satisfied
- somewhat satisfied
- neither satisfied nor dissatisfied
- somewhat dissatisfied
- very dissatisfied

8.7 Overall quality of assistance provided by the department

- very satisfied
- somewhat satisfied
- neither satisfied nor dissatisfied
- somewhat dissatisfied
- very dissatisfied

8.8 Opportunities for useful non-classroom experiences

- very satisfied
- somewhat satisfied
- neither satisfied nor dissatisfied
- somewhat dissatisfied
- very dissatisfied

8.9 Quality of facilities and equipment in the laboratories

- very satisfied
- somewhat satisfied
- neither satisfied nor dissatisfied
- somewhat dissatisfied
- very dissatisfied

9. Please indicate your level of agreement/disagreement with the following statements.

9.1 My major program was too difficult academically.

- strongly agree
- agree
- neither agree nor disagree
- disagree
- strongly disagree

9.2 Required courses were offered with reasonable frequency.

- strongly agree
- agree
- neither agree nor disagree
- disagree
- strongly disagree

9.3 Class sizes were conducive to learning.

- strongly agree
- agree
- neither agree nor disagree
- disagree
- strongly disagree

9.4 Faculty members were genuinely interested in my progress.

- strongly agree
- agree
- neither agree nor disagree
- disagree
- strongly disagree

9.5 There were opportunities to participate in independent projects, internships, and community service.

- strongly agree
- agree
- neither agree nor disagree
- disagree
- strongly disagree

9.6 Course content reflected current trends in my field.

- strongly agree
- agree
- neither agree nor disagree
- disagree
- strongly disagree

9.7 Degree requirements were relevant to my professional goals.

- strongly agree
- agree
- neither agree nor disagree
- disagree
- strongly disagree

9.8 I would recommend the Biology Program to others interested in my field of study.

- strongly agree
- agree
- neither agree nor disagree
- disagree
- strongly disagree

9.9 I think CMU should develop and offer a Master's degree in Biology.

- strongly agree
- agree
- neither agree nor disagree
- disagree
- strongly disagree

10. On a scale of 1 to 5, with 1 being "not at all" and 5 being "a great deal," please rate how our program helped you with the following skill areas.

10.1 Gave me a sense of competence in my major field of study

- 1 2 3 4 5

10.2 Provided the foundation for graduate study

- 1 2 3 4 5

10.3 Helped me understand current issues

- 1 2 3 4 5

10.4 Allowed me to relate theory to practical situations

- 1 2 3 4 5

10.5 Helped me understand human diversity

- 1 2 3 4 5

10.6 Helped me to learn to access information from electronic databases and bibliographic print sources

1 2 3 4 5

10.7 Helped me enhance my critical thinking skills

1 2 3 4 5

10.8 Helped me enhance my quantitative reasoning skills

1 2 3 4 5

10.9 Helped me enhance my written and communication skills

1 2 3 4 5

10.10 Helped me enhance my oral communication skills

1 2 3 4 5

10.11 Helped me enhance my practical laboratory and/or field skills

1 2 3 4 5

11. How well has your education in the Biology Program prepared you for a career or advanced study?

- _____ extremely well
- _____ very well
- _____ moderately well
- _____ slightly well
- _____ not very well

12. How satisfied are you with your overall experience at CMU?

- _____ very satisfied
- _____ somewhat satisfied
- _____ neither satisfied nor dissatisfied
- _____ somewhat dissatisfied
- _____ very dissatisfied

13. If you have any additional comments, please write them in the space below. Thank you for completing this survey.

Appendix G

Biological Sciences Program Assessment Data

COLORADO MESA UNIVERSITY
Three or Six-Year Summary Report

The Colorado Mesa University assessment progress report will consist of areas regarding program student learning outcomes, results, and actions taken over a three-year period. Please attach the last three years of annual assessment reports, and any department/program minutes that recorded discussion of learning outcomes. Summarize each student learning outcome that has been assessed over the past three years. Attach rubrics used in assessment.

Assessment Summary 2016-2019:

Program Outcome 1	Courses/Educational Strategies Used (from Curriculum Map)	Assessment Method(s)	Semester of Data Collection
<p>Outcome #1 Students will demonstrate a broad, comprehensive knowledge of the main areas of biology (including evolution, diversity, ecology, cell biology and genetics) and the ability to apply this knowledge to address new questions. (Specialized Knowledge)</p>	<p>BIOL 105 Attributes of living systems</p> <p>BIOL 301 Principles of Genetics</p> <p>Common core courses in biology</p>	<p>Prefest/Posttest by instructor:</p> <p>Compared the knowledge base entering the biology program or course to knowledge gained while in the program or course. Look at final post test score</p> <p>BIOL 105 Attributes of Living Systems: Improvement in score from 13-question pretest to same embedded questions posttest in final exam N=96 annually</p> <p>BIOL 301 Principles of Genetics Improvement in score from 16-question pretest to same embedded questions post-test in final exam N=80 annually</p>	<p><u>BIOL 105</u> 2016 Pretest =37.3% Posttest =76% correct</p> <p>2017 Pretest=39.1% Post-test= 76%</p> <p>2018 Pretest= 38.8% Posttest=74.8%</p> <p><u>BIOL 301</u> 2016 Pretest=41% Post-test=75% correct</p> <p>2017 Pretest=31.8% Post-test= 73.3%</p> <p>2018 Pretest= 33.4% Post-test=74.8%</p> <p>These courses build on a foundation of knowledge and result in increased ability to critically think as opposed to just building a knowledge base</p>

The changes in our curriculum to better prepare student for their fields of study in Biology has improved our ETS-Major Field Test subscores from the Biology exit exam in Molecular Biology and Genetics. The Biology program offers three different tracks for students interested in careers in the field. While most students are Biology majors, we have a large number of students choosing the Cellular, Molecular and Developmental Biology (CMDB) track.

- BS. Biology for general biology majors
- BS. Cellular and Molecular for students interested in a graduate level education or pre-medicine
- BS. Ecology and evolution for students that want to work for state and federal agencies
- BS. Secondary Ed-Science

Our preliminary benchmark for assessment using the MFT was a mean of 50. With the influx of students into the CMDB track, the scores in Major Field Test have improved in the subscore categories 1 and 2, Cell, Molecular and Genetics. These subscores are relevant to the B.S. Cellular and Molecular majors who wish to pursue additional education. The subscores for Organismal and Ecology knowledge have remained constant and met our benchmarks.

The pre and posttest data evaluated the same students over time and showed knowledge improvement. Posttests all had students answering over 70% of the questions correctly. We will continue to evaluate our curriculum and have assigned faculty members to oversee courses with multiple sections and instructors. This will allow for greater coordination of the courses and allow for standardization of the basic content so that assessment will be relevant to more sections of a course.

Our indirect measure has a low compliance rate- Students are handed the survey, but we need to figure out how to get students to return the survey.

Assessment Summary:

Program Outcome 2	Courses/Educational Strategies Used (from Curriculum Map)	Assessment Method(s)	Semester of Data Collection
<p>Outcome #2 Students will demonstrate the ability to use science as a way of thinking and problem solving. They will be able to make key observations, ask questions, formulate hypotheses, design experiments, collect and analyze data, draw logical conclusions, and explain and defend those conclusions to others. (Quantitative Fluency/Applied Learning)</p>	<p>Biol 105 lab Attributes of Living Systems</p>	<p>Assessment using rubric evaluated four specific questions and evaluated whether objectives Met/ Not met 2016 N= 73 students 2019 N= 74 students</p>	<p>Asked questions and formulated a hypothesis, stated as "If...,then...". 2016 % Met =78 % 2019 % Met= 79%</p> <p>The experimental design included appropriate controls and a sufficient number of biological replicates for statistical power. 2016 % Met= 99% 2019 % Met= 92%</p> <p>Data were analyzed using appropriate statistical tools and included a properly labeled bar graph illustrating the data. 2016 % Met =73% 2019 % Met= 66%</p>

	<p>ETS- Major Field tests</p>	<p>Used assessment indicator – Analytical skills Subscores combined into cohorts: 1-2017 & SP18 (3-semester) N=134 2-F2018-Sp2019 (2-semester) N=57 Overall total N=191</p>	<p>Conclusions were logical and the rationale leading to the conclusion was explained. 2016 % Met= 64% 2019 % Met= 62%</p> <p>Mean % correct varied from previous (2014-16)= 42-45% Current Cohort 1= 45 Cohort 2= 45 (2017-19)=42-49</p>
	<p>Graduating senior exit survey 2017-19 indirect measure</p>	<p>Tabulated results for a question about the biology program in which students choose from a scale of 1-5 1= not at all 5=a great deal N=34</p>	<p>10.8 Help me enhance my quantitative reasoning skills Ave = 4.41 Our benchmark = 4</p>

Results Summary:

Year	Results (include numbers of students)	Target or Benchmark (If Applicable)
2016-2019	<p>BIOL 105 L In 2016 and 2019 the assessment method was configured so that individual components could be isolated and assessed using a rubric of four components which were either Met/Not met 2016 N=73 students 2019 N=74 students Both the ability to formulate hypothesis and design an experiment were Met by greater than 80% of the students in 2016 and 2019</p> <p>Data analysis and the ability to reach a logical conclusion were Met by less than 75% of the students in 2016 and 2019</p>	<p>Benchmark of % Met =70% This was accomplished in 2 out of 4 outcome portions.</p>

	<p>ETS- Major Field Test of Analytical skills is expressed as a Mean Percent correct. This varied from 42-49% (2017-19). N=191</p>	<p>The benchmark for assessment using the MFT was a mean of 50. We missed on this mark for analytical skills but have seen improvement since the last assessment. The MFT is not graded or used to determine graduation so students may not try to score as high as they are capable.</p>
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Actions Taken:

In 2016 and 2019, the individual components were evaluated using a rubric. The assessment looked at four skills: forming a hypothesis, experimental design, data analysis, and the drawing of conclusions. Two of the skills, forming a hypothesis and experimental design, were “Met” in a freshman-level laboratory course. The other two skills, data analysis and the drawing of conclusions, were skills “Not Met” in a freshman-level laboratory course. Both data analysis and the formation of a conclusion are critical thinking skills which are not usually mastered until near graduation. The development of an additional skills laboratory in a junior/senior-level course could be used to determine whether this skill set improves as students approach graduation.

Assessment Summary:

Program Outcome 3	Courses/Educational Strategies Used (from Curriculum Map)	Assessment Method(s)	Semester of Data Collection
<p>Outcome #3 Students will demonstrate the ability to critically search, read, evaluate, and discuss primary literature. (Critical Thinking)</p>	<p>BIOL 208 Fundamentals of Ecology & Evolution</p>	<p>BIOL 208 Fundamentals of Ecology & Evolution</p> <p>Students were given an assignment related to primary literature evaluation. ‘Read the four articles and write an essay that summarizes the essential information’ Papers were graded by instructor then assessed separately(six faculty with three faculty assessing each paper)</p> <p>Assessed with rubric on: Content, Interpretation, Organization, and Form and Clarity</p> <p>BIOL 483 Senior Thesis</p>	<p>Spring 2017 Utilized rubric to assess sampling of students’ ability to summarize primary literature (N= 31) Assessment rubric: (attached)</p> <p>12 point scale Average points=7.06 Mean of points=5.5</p> <p><u>Percent scores</u> Ave. points = 7.06/12= 59% Mean of points= 5.5/12=46%</p> <p>Fall 2019</p>

	<p>BIOL 483 Senior Thesis</p>	<p>Assignment: Students were to find a primary literature article related to use as their thesis topic and summarize the article. Papers were graded by the instructors then assessed separately.</p> <p>Assessed with rubric on: Synthesis/Critical Thinking, Organization, and Form and Clarity</p> <p>Four faculty assessed with two per student assignment (averaged)</p>	<p>Utilized rubric to assess sampling of students' ability to summarize primary literature (N= 20)</p> <p>Assessment rubric: (attached)</p> <p>9-point scale Average points=6.4 Mean of points=7.5</p> <p><u>Percent scores</u> Ave. points = 6.4/9= 71% Mean of points= 7.5/12=83%</p>
	<p>BIOL 483 Senior Thesis</p>	<p>The rubric also assessed Synthesis/Critical Thinking separately (see BIOL 483 rubric)</p> <p>1=Beginning 2=Developing 3=Accomplished N=20</p>	<p>Fall 2019 Looked at faculty scoring on assessment rubrics. All faculty scored students at either a 2 or 3. None were scored at 1. Ave=2.25 2= Doesn't adequately summarize/reviewed the research (1^o literature assignment) 3=Does accurately and in depth summarize/review the research (1^o literature assignment)</p>
	<p>Graduating senior exit survey 2017-19 indirect measure</p>	<p>Tabulated results for a question about the biology program in which students choose from a scale of 1-5 1= not at all 5=a great deal N=34</p>	<p>10.7 Helped me enhance my critical thinking skills Ave=4.53 Our benchmark = 4</p>

Results Summary:

Year	Results (Include numbers of students)	Target or Benchmark (If Applicable)
2017-2019	BIOL 208 vs 483	Benchmark is still evolving for sophomore and senior level courses,

	<p>We used a comparison benchmark to see the difference in students' ability to integrate and summarize information in BIOL 208 Ecology and Evolution (N=31) and BIOL 483 Senior Thesis (N=20). Although a different number of points were assessed using the rubric, we were able to compare percent scores between the sophomore and senior level courses.</p> <p>BIOL 208 vs BIOL 483 Percent scores Ave. points 59 vs 71 % Mean of Points 46 vs 83%</p> <p>Utilizing the rubric we saw improvement in Critical Thinking</p> <p>The BIOL 208 assignment used a rubric with a 12-point scale, with Developing being the midpoint</p> <p>The BIOL 483 assignment used a rubric with a 9-point scale, with Accomplished being between 6 and 9 on the scale</p>	<p>but in general the benchmark is the expectation that: should see improvement in percent scores between a sophomore vs senior level 1^o research literature summary</p> <p>Sophomore benchmark should be scores between 3-6 on a 12-point scale so that students are between Beginning to Developing on the rubric. Benchmark Met with mean point score= 5.5</p> <p>Senior benchmark should be scores between 6 and 9 = Developing to Accomplished. Benchmark met with Mean point score=7.5</p>
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Actions Taken:

The assessment of Critical Thinking can use many of the same assessments or portions of other assessments that have been used in other outcomes. This outcome can be assessed in written assignments as a single category of a rubric or by the whole rubric used to evaluate a writing assignment. Multiple courses require writing in laboratory sections (laboratory reports) and in lecture (papers). We utilize core courses like BIOL 208 and BIOL 483 for this assessment. We still need to develop a rubric that will specifically assess critical thinking. For BIOL 483, which requires students to write a 25-page research paper based on primary literature, the assessment of an outcome is problematic. Assessing individual components of a 25-page paper is problematic, so shorter written assignments were assessed. The assessment data used for BIOL 483 were collected from the first written assignment. For future assessment, it may be more appropriate to compare assignments from early versus later in a semester. This may be a more relevant comparison.

Assessment Summary:

Program Outcome 4	Courses/Educational Strategies Used (from Curriculum Map)	Assessment Method(s)	Semester of Data Collection
Outcome #4 Students will demonstrate effective Biological communication skills, both in	BIOL 105L Attributes of Living Systems	BIOL 105L Rubric used to assess portion of laboratory writeup. Student will demonstrate effective Biological communication skills both in	Clear writing style with correct grammar and logical sequencing of the sections. 2019 % Met=86%

		1= not at all 5=a great deal N=34	10.10 Helped me enhance my oral communication skills Ave=4.15 Our benchmark=4
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Results Summary:

Year	Results (Include numbers of students)	Target or Benchmark (If Applicable)
2016-19	<p>BIOL 105L Laboratory writeup assessment looked at beginning communication skills of clear writing and proper grammar.</p> <p>BIOL 208 vs BIOL 483 This was a comparison benchmark to see the difference in communication skills between BIOL 208 (N=31) and BIOL 483 Senior thesis (N=20). We started with BIOL 208 since students should have completed ENGL 111 Composition and then assessed the same cohort in their senior year. Although a different number of points were used in the rubric for the assessment, we were able to compare percent scores between the sophomore and senior level course.</p> <p>BIOL 208 vs BIOL 483 Percent scores: Ave. points 59 vs 71 % Mean of Points 46 vs 83%</p> <p>Utilizing the rubrics, we saw improvement in Communication Fluency between sophomore-level to senior-level students.</p>	<p>Benchmark % Met =75% was achieved</p> <p>Benchmark for Communication Fluency is still being developed for sophomore vs senior level course.</p> <p>Although the benchmark has not been determined, the difference between the writing assignments is significant between BIOL 208 vs BIOL 483. With a 12% increase in Average point percent scores and a 37% increase in the mean of point percent scores</p>

Actions Taken:

During this assessment period, the department closed the loop in this part of the assessment by assessing this outcome in sophomore versus senior level courses. The rubric used to assess the BIOL 208 essay was not as appropriate for assessing the assignment given in BIOL 483. Developing a rubric that is appropriate for both assessments would improve our ability to evaluate communication fluency. The assessment categories on the rubric should be equivalent. Additional years of data will need to be collected on this outcome for comparison before a benchmark can be established for 100-200 level versus 300-400 level course writing assignments. Additional assessments and rubric development are needed.

Assessment Summary:

Program Outcome 5	Courses/Educational Strategies Used (from Curriculum Map)	Assessment Method(s)	Semester of Data Collection
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N/A			
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Results Summary:

Year	Results (Include numbers of students)	Target or Benchmark (If Applicable)

Actions Taken:

Assessment Summary:

Program Outcome 6	Courses/Educational Strategies Used (from Curriculum Map)	Assessment Method(s)	Semester of Data Collection
N/A			

Results Summary:

Year	Results (Include numbers of students)	Target or Benchmark (If Applicable)

Actions Taken:

COLORADO MESA UNIVERSITY
Three- or Six-Year Summary Report

The Colorado Mesa University assessment progress report will consist of areas regarding program student learning outcomes, results, and actions taken over a three-year period. Please attach the last three years of annual assessment reports, and any department/program minutes that recorded discussion of learning outcomes. Summarize each student learning outcome that has been assessed over the past three years. Attach rubrics used in assessment.

Assessment Summary:2013-2016

Program Outcome 1	Courses/Educational Strategies Used (from Curriculum Map)	Assessment Method(s)	Semester of Data Collection
<p>Outcome #1 Students will demonstrate a broad, comprehensive knowledge of the main areas of biology (including evolution, diversity, ecology, cell biology, and genetics) and the ability to apply this knowledge to address new questions. (Specialized Knowledge)</p>	<p>BIOL 105 BIOL 106/107 BIOL 208 BIOL 301 Common core courses in biology</p>	<p>Pretest/Posttest by instructor: Compared the knowledge base entering the biology program or course to knowledge gained while in the program or course. Look at final pos test score Placed questions within exams to a determine breadth of knowledge across species in 20 phyla or categories N=39 students Compared the knowledge base entering the biology program or course to knowledge gained while in the program or course. Look at final posttest score</p>	<p>Improvement in score from pre to post test 2014 BIOL 105 = 53% ave with 79.5% correct posttest 2016 BIOL 105 = 39% with 76% correct posttest 2014 BIOL 107= 55% with 86% correct posttest Introductory courses in which students build a foundation in the sciences by increasing their overall knowledge 2016 BIOL 107 =77% correct 2014 BIOL 208= 24% with 76% correct posttest 2014 BIOL 301= 27% with 78% correct posttest 2016 BIOL 301=41% with 75% correct posttest</p>

	ETS- Major Field tests	Use national standardized test which evaluates knowledge in discreet categories N=149	These courses build on a foundation of knowledge and result in increased ability to critically think as opposed to just building a knowledge base Scores stable over multiple years with improvement in subscores 1 & 2 (2014-16) Subscore 1 Cell Biology, 50-56 2 Molecular Biology & Genetics, 51-57 3 Organismal Biology, 52-53; 4 Population Biology, Evolution and Ecology, 50-52
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Results Summary:

Year	Results (include numbers of students)	Target or Benchmark (If Applicable)
2014-2016	<p>Improvement in pre-post test scores were consistent in both freshman introductory Biology courses (ave N=96) and upper-division junior-level Biology courses. The percent improvement in knowledge was higher in the freshman-level course, which suggests that incoming freshmen are building a foundation of knowledge. All the posttests had correct scores that exceeded 70%.</p> <p>The ETS- Major field tests which tested knowledge in cellular, molecular, organismal and ecology resulted in consistent scores between 50-57. (N=149)</p>	<p>Our preliminary benchmark for posttests was at least 70% correct on the posttest. Benchmark consistently met.</p> <p>Our preliminary benchmark for assessment using the MFT was a mean of 50. This benchmark was met.</p>

Actions Taken (Briefly describe the analysis of the results and actions taken for future assessment. Indicate any budget implications based on the analysis. Limit 150 words.)

Within the last three years we have made improvements in our curriculum to better prepare student for their fields of study in Biology. The Biology program offers three different tracks for students interested in careers in the field.

- B.S. Biology for general Biology majors

- B.S. Cellular and Molecular for students interested in a graduate-level education or pre-medicine
- B.S. Ecology and evolution for students who want to work for state and federal agencies.

Our preliminary benchmark for assessment using the MFT was a mean of 50. With the changes to curriculum, the scores in Major Field Test have improved in the subscore categories 1 and 2; Cell, Molecular and Genetics. These subscores are relevant to the B.S. Cellular and Molecular majors who wish to pursue additional education. Our subscores for Organismal and Ecology knowledge have remained constant and met our benchmarks.

There were variations in how individual faculty reported their data, as well as variations in the topics covered in one class, depending on the faculty member. For reporting the data, some tracked results for each question while some gave an overall percent correct. We have recently begun the process of evaluating our curriculum and assigned faculty members to oversee courses with multiple sections and instructors. This will allow for greater coordination of the courses and allow for standardizing the basic content so that assessment will be relevant to all sections of a course. Since Biology has divided the major into different tracks, we can evaluate the courses included in all three tracks, BIOL 105 Attributes, BIOL 208 Ecology and Evolution, BIOL 301 Genetics, and BIOL 438 Senior thesis, to be sure all tracks meet basic Biology major needs.

Assessment Summary:

Program Outcome 2	Courses/Educational Strategies Used (from Curriculum Map)	Assessment Method(s)	Semester of Data Collection
Outcome #2 Students will demonstrate the ability to use science as a way of thinking and problem solving. They will be able to make key observations, ask questions, formulate hypotheses, design experiments, collect and analyze data, draw logical conclusions, and explain and defend those conclusions to others.	BIOL 105 lab	Rewrite of lab writeup Original catalase writeup=62% ave Rewrite =82% ave	2014 Look at improvement in writeup grade 20% improvement in lab writeup grade
		Assessment using rubric evaluated four specific questions and evaluated as to whether objectives are Met/ Not met N=73 students	2016 Asked questions and formulated a hypothesis, stated as "If...,then...". % Met = 78% The experimental design included appropriate controls and a sufficient number of biological replicates for statistical power. % Met = 99%

(Quantitative Fluency/Applied Learning)	ETS- Major Field tests	Used assessment indicator – Analytical skills N=149 students	Data were analyzed using appropriate statistical tools and included a properly labeled bar graph illustrating the data. % Met=73; Conclusions were logical, and the rationale leading to the conclusion was explained. % Met=64; Mean % correct varied from 42-45% (2014-16)
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Results Summary:

Year	Results (Include numbers of students)	Target or Benchmark (If Applicable)
2014-2016	<p>Initially had students do a laboratory write-up which was graded and then returned so that students could rewrite the lab with additional instruction and then regraded. This method showed improvement in the writeup but did not assess individual components.</p> <p>In 2016 the assessment method was reconfigured so that individual components could be isolated and assessed using a rubric of four components which were either Met/Not met (N=73) Both the ability to formulate hypotheses and design an experiment were Met by greater than 80% of the students</p> <p>Data Analysis and the ability to reach a logical conclusion were Met by less than 75% of the students</p> <p>ETS- Major Field test of Analytical skills Mean had % correct that varied from 42-45% (2014-16).</p>	<p>Saw improvement in writeup but unable to determine impact on outcome.</p> <p>Benchmark of Met 70% This was accomplished in 2 out of 4 outcome portions.</p> <p>The benchmark for assessment using the MFT was a mean of 50. We missed on the mark on analytical skills at approx..45%, but all other benchmarks were met. The MFT is not</p>

		graded or used to determine graduation so students may not try to score as high as they are capable of.
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Actions Taken:

Initially in 2014, the grading rubric for the BIOL 105L lab report did not specifically separate the quantitative analysis portion of the report from the written communication portion, or even the hypothesis formulation portion. In 2016 the individual components were evaluated using a rubric. Looking at them in isolation made it apparent that data analysis and the drawing of conclusions were a skill that was not yet mastered. When compared to the other two skills, forming a hypothesis and experimental design, this is not unexpected in a freshman-level laboratory course. Both data analysis and the formation of a conclusion are critical thinking skills which are not usually mastered until near graduation. These two skills will need to be assessed again in an upper-division course.

Assessment Summary:

Program Outcome 3	Courses/Educational Strategies Used (from Curriculum Map)	Assessment Method(s)	Semester of Data Collection
Outcome #3 Students will demonstrate the ability to critically search, read, evaluate, and discuss primary literature. (Critical Thinking)	BIOL 107/106 BIOL 301 Genetics BIOL 483 Thesis	BIOL 107L Principles of Plant Biology Laboratory: Students were given assignments related to primary literature evaluation. Assessed with rubric on organization, content, mechanics, and sources	Spring 2016 Utilized rubric to assess students ability to summarize primary literature (N= 56) Assessment results using rubric: (attached) Organization, Content and Mechanics--majority of students accomplished or developing Sources--majority of students were exemplary

Results Summary:

Year	Results (Include numbers of students)	Target or Benchmark (If Applicable)
2014-2016	Biol 107 lab (N=56) Rubric showed students exceeded benchmark but rubric utilized only for Sp16 labs.	Benchmark is developing for freshman /sophomore level course

Actions Taken:

This portion of assessment has been problematic since it is done in a variety of courses but has not been assessed in a core course of all three Biology major tracks. This outcome can be assessed in BIOL 483, which requires students to write a twenty-five page research paper based on primary literature, but a rubric for assessment has not been developed. Assessing individual

	<p>Evaluated individual component of clear writing style and correct grammar</p> <p>BIOL 107 labs (N=14 groups of students) from assessment of student group presentations</p>	<p>Benchmark of Met 70% This was accomplished with Met 79.5%</p> <p>For a sophomore course presentation the benchmark is satisfactory</p>
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Actions Taken:

Initially in 2014 the grading rubric for the BIOL 105L lab report did not specifically separate the quantitative analysis portion of the report from the written communication portion, or even the hypothesis formulation portion. In 2016 the individual components were evaluated using a rubric. Looking at them in isolation, the grammar and writing style can be assessed with a simple rubric. This method of assessment does a better job of assessing outcome #4. Additional years of data will need to be collected on this outcome from upper-division courses rather than just a freshman-level writing assignment.

Assessment Summary:

Program Outcome 5	Courses/Educational Strategies Used (from Curriculum Map)	Assessment Method(s)	Semester of Data Collection
N/A			

Results Summary

Year	Results (Include numbers of students)	Target or Benchmark (If Applicable)

Actions Taken:

Assessment Summary:

Program Outcome 6	Courses/Educational Strategies Used (from Curriculum Map)	Assessment Method(s)	Semester of Data Collection
N/A			

Results Summary

Year	Results (Include numbers of students)	Target or Benchmark (If Applicable)

Actions Taken:

Biological Sciences
Program Assessment Report
Bachelor of Science/Biology Concentration
Data Collection from Spring/Fall 2014-2016

I. Learning outcomes and assessment results

Outcome #1 Students will demonstrate a broad, comprehensive knowledge of the main areas of biology (including evolution, diversity, ecology, cell biology and genetics) and the ability to apply this knowledge to address new questions. (Specialized Knowledge)

Data for Outcome #1:

1. Assessment of core courses with a pretest and exam embedded post test:

2014 data

BIOL 105 Attributes of Living Systems: Pretest/Post test by instructor:

Pretest % correct: 29%; Posttest % correct: 78%= 49% diff

Pretest % correct: 24%; Posttest % correct: 81%=57% diff

BIOL 106 Principles of Animal Biology: Data were not collected

BIOL 107 Principles of Plant Biology: pooled data from two instructors, only using the questions used by both instructors:

Pretest % correct: 31%; Posttest % correct: 86%=55% diff

BIOL 208 Fundamentals of Ecology and Evolution:

Pretest % correct: 47%; Posttest % correct: 71%=24% diff

BIOL 301 Genetics:

Pretest % correct: 51%; Posttest % correct 78%=27% diff

2016 data

BIOL 105 Attributes of Living Systems: Pretest/Posttest by instructor:

Pretest % correct: 37.3% Posttest % correct: 76%=39% diff

BIOL 106 Principles of Animal Biology:

Knowledge from multiple Phylum – questions implanted in exam

Broad based knowledge across Phylum % correct:77.7

BIOL 107 Principles of Plant Biology: pooled data from 2 instructors .

Embedded questions in exams. Embedded 25 questions with 23 of the question being correctly answered over 70 % of the time

BIOL 208 Fundamentals of Ecology and Evolution: not evaluated

BIOL 301 Genetics: Pre-test/Posttest by instructor:

Pretest % correct: 33.4%; Posttest % correct 74.8%=41% diff

2. Major Fields Test data for

Spring 2014: N= 39 students

Subscore means for each of 4 categories were reported.

Subscore 1 Cell Biology, 50;

Subscore 2 Molecular Biology and Genetics, 51;

Subscore 3 Organismal Biology, 53;

Subscore 4 Population Biology, Evolution and Ecology, 52

Spring 2015; N= 59 students

Subscore means for each of 4 categories were reported.

Subscore 1 Cell Biology, 52;

Subscore 2 Molecular Biology and Genetics, 51;

Subscore 3 Organismal Biology, 52;

SubScore 4 Population Biology, Evolution and Ecology, 50

Spring 2016: N=51 students

Subscore means for each of 4 categories were reported.

Subscore 1 Cell Biology, 56;

Subscore 2 Molecular Biology and Genetics, 57;

Subscore 3 Organismal Biology, 53;

SubScore 4 Population Biology, Evolution and Ecology, 52

3. Senior Exit Survey: two questions relate to specialized knowledge: “10.1 Gave me a sense of competence in my major field of study”, and “10.4 Allowed me to relate theory to practical situations”. On a scale of 1-5, where 1 was “not at all” and 5 was “a great deal”

the scores for both questions:

Spring 2014= 4.1.

Spring 2015= $4.65 + 4.35/2 = 4.5$

Spring 2016= $4.14 + 4.00/2 = 4.06$

Outcome #2 Students will demonstrate the ability to use science as a way of thinking and problem solving. They will be able to make key observations, ask questions, formulate hypothesis, design experiments, collect and analyze data, draw logical conclusions and explain and defend those conclusions to others. (Quantitative Fluency/Applied Learning)

Data for Outcome #2:

1. Course assessment evaluations

Spring 2014

BIOL 105L Attributes of Living Systems Laboratory: students complete several formal reports requiring the analysis of experimentally collected data, and drawing conclusions based on the data. Reports are graded using a rubric. Students were graded initially on the catalase exercise report with the rubric, and given the opportunity to rewrite the report. The results of 4 lab sections showed that the initial grade on the catalase report was an average of 62%. The rubric, with identified deficiencies, was included with the original graded report. When students completed the re-write, with the additional guidance of the graded rubric, the average score increased to 82%, a twenty percent improvement overall.

Spring 2016

Changed the method of evaluation to assess specific abilities regarding how to use science as a way of thinking and solving problems. Assessed whether the stated objective was Met/Not Met using rubric with the following questions; (average of 3 BIOL 105L sections with 2 instructors)

Asked questions and formulated a hypothesis, stated as “If...,then...”.

% Met 78 ; % Unmet 22

The experimental design included appropriate controls and a sufficient number of biological replicates for statistical power.

% Met 99; % Unmet 1

Data were analyzed using appropriate statistical tools and included a properly labeled bar graph illustrating the data.

% Met 73; % Unmet 27

Conclusions were logical and the rationale leading to the conclusion was explained.

% Met 64; % Unmet 36

BIOL 107L Principles of Plant Biology Laboratory: students completed several projects related hypothesis formation, data collection and analysis, and drawing appropriate conclusions. Assessment data were not collected.

BIOL 301L Genetics Laboratory: students design and implement a group project based on fruit fly genetics. The exercise requires a formal report using scientific format and a final oral presentation. Assessment data were not collected.

2. Major Field Test data: Assessment indicator #9, Analytical Skills.
2014 - 39 students completed the test. On analytical skills, the mean percent correct was 44%.
2015 - 59 students completed the test. On analytical skills, the mean percent correct was 42%.
2016 - 51 students completed the test. On analytical skills, the mean percent correct was 45%.
3. Exit Survey: Several questions relate to critical thinking and quantitative skills, as well as written and oral communication skills. In answer to the questions “10.7-10. Helped me enhance my (critical thinking, quantitative, written communication, or oral communication) skills.”, students rated their experience on a 5 point scale, where 1 was “not at all”, and 5 was “a great deal”.
The overall average of the responses; was over 4 for all four questions in each year tabulated
Spring 2014: (4.5, 4.2, 4.6, 4.1, respectively).= 4.35
Spring 2015: (4.6, 4.55,4.5,4.05 respectively)=4.43
Spring 2016: (4.42,4.38,4.21,3.88 respectively)=4.22

Outcome #3 Students will demonstrate the ability to critically search, read, evaluate and discuss primary literature. (Critical Thinking)

Data for Outcome #3:

1. BIOL 107L Principles of Plant Biology Laboratory: Students were given assignments related to primary literature evaluation.

Spring 2014 Assessment data were not collected.

Spring 2016 Utilized rubric to assess students ability to summarize primary literature (N= 56)

Assessment results using rubric: (attached)

Organization, Content and Mechanics –majority students accomplished or developing

Sources- majority of students were exemplary

2. BIOL 301 Genetics: Assignments related to current topics were assigned, with a grading rubric. Assessment data were not collected.
3. BIOL 483 Senior Thesis: students search primary literature, prepare an in-depth thesis, and give an oral presentation. Rubric in development

Outcome #4 Students will demonstrate effective Biological communication skills, both in writing and orally. (Communication fluency)

Data for Outcome #4:

1. BIOL 105L Attributes of Living Systems Laboratory:

Spring 2014

Same assessment as was used in Outcome # 2 in 2014.

Students complete several formal reports requiring the analysis of experimentally collected data, and drawing conclusions based on the data. Reports are graded using a rubric. Students were graded initially on the catalase exercise report with the rubric, and given the opportunity to rewrite the report. The results of 4 lab sections showed that the initial grade on the catalase report was an average of 62%. The rubric, with identified deficiencies, was included with the graded report. When students completed the re-write, with the additional guidance of the graded rubric, the average score increased to 82%, a twenty percent improvement overall.

Spring 2016

Same assessment as was used in Outcome # 2 in 2016.

Assessment using rubric of clear writing style with correct grammar and logical sequencing of the sections. Evaluated with Met/Not Met

(average of 3 BIOL 105L sections with 2 instructors)

% Met 79.5; % Unmet 20.5

2. BIOL 107L Principles of Plant Biology Laboratory:

Spring 2014 Data were not collected.

Spring 2016 Utilized rubric to assess communication skills during student presentations (N= 14 groups of students)

Rubric assessed (attached)

Appearance – majority satisfactory

Mechanics - Majority satisfactory

Content- Split between Excellent- satisfactory

Presentation – Majority satisfactory

For a sophomore course presentation the benchmark is satisfactory

3. BIOL 483 Senior Thesis: data were not collected.

II. Analysis of Data

Within the last three years we have made improvements in our curriculum to better prepare student for their fields of study in Biology. The Biology program offers three different tracks for students interested in careers in the field.

- BS. Biology for general biology majors
- BS. Cellular and Molecular for students interested in a graduate level education or pre-medicine
- BS. Ecology and evolution for students that want to work for state and federal agencies.

Our preliminary benchmark for assessment using the MFT was a mean of 50. With the changes to curriculum, the scores in Major Field Test have improved in the subscore categories 1 and 2; Cell, Molecular and Genetics. These subscores are relevant to the B.S. Cellular and Molecular majors who wish to pursue additional education. Our subscores for Organismal and Ecology knowledge have remained constant and met our benchmarks.

The MFT score for analytical skills has been at approximately 44% which has not met our benchmark, but benchmarks were met for all the Outcome #1 subscores of knowledge content within a specific field.

Our preliminary benchmark for posttests: Embedded questions or lab rewrites were at least 70% correct. We also met all benchmarks with those assessment tools, though data were not included from all instructors. Only some of the labs collected data since most labs have several sections taught by multiple instructors. Instructors who teach multiple sections of a lab did participate in the assessment.

For outcomes #2 and 4: The assessment was changed from grading a lab report re write-up. Using a rubric for the BIOL 105L lab report, this specifically separates the quantitative analysis portion and the hypothesis formulation portion of the report

III. Actions to Improve Student Learning and Assessment

1. There were variations in how individual faculty reported their data. Data were reported from a course or section, as well as variations in the topics covered in one class, depending on the faculty member. For reporting the data, some tracked results for each question while some give an overall percent correct. None tracked individual students. On the variation in topics covered, I did not include data from one instructor in BIOL 105 because this instructor did not include several topics during the course related to the pretest questions. That led to a pretest percent correct of 39% but a posttest score of only 59%. While the assessment indicated improvement, this result would not be an accurate reflection of the overall assessment of the topics covered.

2. The MFT is not **graded** or used to **determine graduation**. Therefore students may not take the test seriously. Over the years, scores go up or down in what appears to be a random way.
3. We need to determine the value of **specific pretest/posttest questions** to ensure that the data is meaningful. For data in which the percent correct on each question was given, some questions had low percent correct on both the **pretest** and the **posttest**, while other questions had high percent correct on both the pretest and the posttest.
4. Weaker students may drop the course before completing the final assessment, so overall percentage increases may be partly due to better students remaining rather than truly representing the quality of the instruction. For example, 39 students took the pretest in one of the sections of BIOL 105, but only 32 students took the posttest.
5. In assessing the upper level genetics course, it is obvious that students are coming into the course with a higher general understanding of the material. Should benchmarks be different?
6. On the grading rubric for the BIOL 105L lab report, we did not specifically separate the quantitative analysis portion of the report from the written communication portion, or even on the hypothesis formulation portion. It might be interesting to see what the individual components look like in isolation.
7. Data collection is inconsistent or absent. This occurs due to failures in communication, misunderstood expectations for data collection, or faculty simply forgot to collect the data from the activities completed in class. As assessment becomes routine, and the assessment tools prove valuable to curriculum development data collection and evaluation will occur without gaps

IV. Changes to address the issues:

Issues:

1. Determine the assessment indicator that would be shared by all instructors of the same course. Then some minor variations in course delivery could occur without affecting the core value of the assessment. We will also insure that data is presented in the same way from each instructor.
2. Define the courses in which data collection and assessment need to occur. The assessment also needs to be linked so we can see progression in the student knowledge and critical thinking skills. Within the last three years, we made changes in the curriculum that separated the major into three tracks: B.S. Biology track, B.S. Cellular Molecular track, and B.S. Ecology and Evolution track. All the tracks have a core of four courses that can be assessed. These are BIOL 105 Attributes of Living Systems, BIOL 208 Fundamentals of Ecology and Dvolution, BIOL 301 Genetics, and BIOL 483 Senior

Thesis. Some data collected from courses do not reflect what all Biology majors are learning since they no longer study the material from those courses.

3. Set clear expectations for assessment. Clearly communicate the expectations and procedure for data collection. Determine the method of assessment so that data is consistent and analysis is standardized so that all sections of a course are valid. Reminders can be sent for future data collections. We have established faculty leaders for multiple-section courses that can help to coordinate the collection in and individual course.
4. Consider changing to the MCAT or Graduate record exam to assess our graduates. Not all our graduates take these exams, but those who do are seriously interested in doing well, which may be a better indicator of their learning outcomes. Even if a student is not interested in medical school or graduate school, most students know that these test mean something, while they also know that the MFT is not used for any future admission standards.
5. Continue to try different methods of assessment to determine which may be more reflective of student progress:
 - a. We will track results for each question, rather than pooled data, in order to determine if some questions are better indicators of learning than others.
 - b. We will track specific students in order to determine progress, as well as to determine the effect of perhaps weaker students dropping the course before completing the assessment.
 - c. For upper-level course assessment, benchmarks should be raised to better reflect success in meeting learning outcomes.
 - d. For assessment using lab reports and a grading rubric, specific outcomes will be assessed separately, rather than looking only at the overall average, to assess several different learning outcomes.

COLORADO MESA UNIVERSITY
Program Outcome and Assessment Plan Template

Program Name: Biological Sciences curriculum map

Date: Updated September 2019

Program Outcomes	Courses/Educational Strategies Indicate if outcome is Beginning(B), Developing(D) or Advanced(A)	Assessment Method(s)	Time of Data Collection/ Person Responsible	Results of Assessment	Actions Taken
Outcome #1 Students will demonstrate a broad, comprehensive knowledge of the main areas of biology (including evolution, diversity, ecology, cell biology and genetics) and the ability to apply this knowledge to address new questions. (Specialized Knowledge)	Core courses: BIOL 105/105L (B) or BIOL 208/208L (B) BIOL 301/301L (B) Major Fields Test (A) Exit survey (A)	What: Exam questions or assignments in the courses How: Assessment embedded questions What: National Test How: Assessment indicators cover diversity of organisms, animals, plants, population genetics and evolution, and ecology What: Alumni & Exit survey given to graduating seniors How: Questions on the survey relate to the student's feelings about their level of biological knowledge	Who: All course instructors When: Either at the end of the semester or during the semester, depends on the course. Who: Campus testing center When: Semester before graduation Who: CMU marketing and the foundation gather alumni info & the department administrative assistant gathers exit surveys from graduating seniors When: Summer surveys & the Semester before graduation	Results: Key Findings: Conclusions: See assessment summary	Action: Re-evaluation Date: See assessment summary

<p>Outcome #2</p> <p>Students will demonstrate the ability to use science as a way of thinking and problem solving. They will be able to make key observations, ask questions, formulate hypotheses, design experiments, collect and analyze data, draw logical conclusions and explain and defend those conclusions to others.</p>	<p>BIOL 105L (B)</p> <p>Or</p> <p>BIOL 301L (D)</p>	<p>What: Rubric for grading lab reports. How: The reports will demonstrate the student's ability to collect and analyze data, and explain conclusions</p> <p>What: Rubric for grading both written and oral presentations How: students will design experiments, analyze data, and explain conclusions in both written and oral form</p> <p>What: National Test How: Assessment indicator for analytical skills</p> <p>What: Alumni & Exit survey How: Questions on the survey relate to the student's feelings about their critical thinking skill, quantitative reasoning, as well as written and oral communication skills</p>	<p>Who: All instructors When: As students complete written assignments related to the laboratory experiments</p> <p>Who: All instructors When: Students complete a semester long genetics experiment</p> <p>Who: Campus testing center When: Semester before graduation</p> <p>Who: CMU Alumni & The assistant gathers exit surveys from graduating seniors When: Semester before graduation</p>	<p>Results: Key Findings: Conclusions:</p>	<p>Action: Re-evaluation Date:</p>
<p>Outcome #3</p> <p>Students will demonstrate the ability to critically search, read, evaluate and discuss primary literature.</p>	<p>BIOL 208 (B)</p>	<p>What: Assignments related to primary literature How: Grading rubric to indicate the level of understanding</p>	<p>Who: Course instructors When: During the semester</p>	<p>Results: Key Findings: Conclusions:</p>	<p>Action: Re-evaluation Date:</p>

<p>(Critical Thinking)</p>	<p>BIOL 301 (B)</p>	<p>What: Assignments related to current topics in genetics How: Grading rubric to indicate discussion of current topics</p>	<p>Who: Course Instructors When: During the semester</p>	
	<p>BIOL 483 (D)</p>	<p>What: Students search biological primary literature to prepare an in-depth thesis How: Grading rubric</p>	<p>Who: Course instructors When: At the end of the semester</p>	
<p>Outcome #4 Students will demonstrate effective Biological communication skills, both in writing and orally. (Communication fluency)</p>	<p>BIOL 105L (B) or BIOL 208 (B) BIOL 483 (B)</p>	<p>What: Lab reports How: Grading rubric What: Written reports and How: Grading rubric.</p>	<p>Who: Course Instructors When: During the semester Who: Course instructors When: End of semester</p>	<p>Results: Key Findings: Conclusions: A R</p>

Adapted from Long Beach City College and Indiana State University Assessment Plans

Basic (B): retention and comprehension Developing (D): analysis and application Advanced (A): evaluation and creation

The core courses for the Biology program are BIOL 105/105L Attributes of Living Systems; 208/208L Fundamentals of Ecology and Evolution; 301/301L Principles of Genetics; and 483 Senior Thesis. Students then select additional course work or take required courses depending on the Biology Track: B.S. Biology, CMDB, or EEOB. Students in the Secondary education track are required to take BIOL 105/105L and BIOL 483 Senior Thesis.

Curriculum Map of Biological Sciences Student Learning Objectives

Courses	SLOs	SLO 1	SLO 2	SLO 3	SLO 4
BIOL 493	Lab Teaching Practicum				
BIOL 487	Advanced Research		X	X	X
*BIOL 483	Senior Thesis			X	X
BIOL 482	Senior Research			X	X
BIOL 450/450L	Mycology	X		X	X
BIOL 442	Pharmacology	X			
BIOL 441	Endocrinology	X		X	
BIOL 433	Marine Invert Communities	X		X	X
BIOL 431/431L	Animal Parasitology	X	X		
BIOL 426/426L	Intro to Electron Microscopy	X			
BIOL 425	Molecular Genetics	X		X	
BIOL 423/423L	Plant Anatomy	X		X	X
BIOL 421/421L	Plant Physiology	X	X	X	X
BIOL 418/418L	Wildlife Mgmt/Fld Tech	X	X		
BIOL 316/316L	Animal Behavior (Ethology)	X	X		
BIOL 415	Tropical Ecosystems	X			
BIOL 414/414L	Freshwater (Aquatic Biology)	X	X		
BIOL 413/413L	Herpetology	X	X		
BIOL 412/412L	Ornithology	X	X		
BIOL 411/411L	Mammalogy	X	X		
BIOL 410/410L	Human Osteology	X			
BIOL 409/409L	Gross Dev and Human Anatomy	X			
BIOL 408	Desert Ecology	X			
BIOL 406	Plant-Animal Interactions	X			
BIOL 405/405L	Advanced Ecological Methods	X	X		
BIOL 403	Evolution	X	X	X	X
BIOL 387	Structured Research			X	X
BIOL 371L	Lab Invest in Cell and Molec Biol	X	X	X	X
BIOL 350/350L	Microbiology	X	X		
BIOL 344/344L	Forensic Molecular Biology	X	X		
BIOL 343	Immunology	X		X	
BIOL 342/342L	Histology	X			
BIOL 341/341L	General Physiology	X	X		X
BIOL 336	Fish Biology	X			
BIOL 335/335L	Invertebrate Zoology	X		X	X
BIOL 333	Marine Biology	X		X	X
BIOL 331/331L	Insect Biology	X			
BIOL 322/322L	Plant Identification	X		X	
BIOL 321/321L	Taxonomy of Grasses	X		X	X
BIOL 320	Plant Systematics	X		X	X
BIOL 315	Epidemiology	X			
BIOL 310/310L	Developmental Biology	X	X	X	X
BIOL 302	Cellular Biology	X			
*BIOL 301/301L	Principles of Genetics	X	X	X	
BIOL 250/250L	Intro to Medical Microbiology	X	X		
BIOL 241	Pathophysiology	X		X	
BIOL 211/211L	Ecosystem Biology	X			
BIOL 210/210L	Human Anat. and Physiol. II	X			
BIOL 209/209L	Human Anat. and Physiol.	X			
*BIOL 208/208L	Fundamentals of Ecol. Evol.	X			
BIOL 108/108L	Diversity of organisms	X			
BIOL 107/107L	Principles of Plant Biology	X		X	X

BIOL 106/106L	Principles of Animal Biology	X			
*BIOL 105/105L	Attributes of Living Systems	X	X		X
CMU Biology Graduates will be able to...					
1) Students will demonstrate a broad, comprehensive knowledge of the main areas of biology (including evolution, and the ability to apply this knowledge to address new questions.					
2) Students will demonstrate the ability to use science as a way of thinking and problem solving. They will be able to formulate hypotheses, design experiments, collect and analyze data, draw logical conclusions and explain and defend					
3) Students will demonstrate the ability to critically search, read, evaluate and discuss primary literature.					
4) Students will demonstrate effective biological communication skills, both in writing					
*Required core courses					

Appendix H

General Education Assessment Notes from 2017

Colorado Mesa University
Quantitative Literacy Assessment Pilot 2-16-17

First session, October 27, 2016

In Attendance: Dave Weinberg, Tim D'Andrea, Susan Longest, Shawn Robinson, Suzanne Lay, Kelly O'Connell, Bette Schans

Faculty from the Natural Sciences and Math met with the DASL, the FAC and Kelly O'Connell from the Assessment Committee to discuss assessment in quantitative literacy (QL). The discussion centered on the commonalities and differences in assessment for Biology, Physical and Environmental Sciences and Math in Essential learning courses.

The following questions were posed to the group:

- What do we want the students to get out of it? Do the performance indicators on the rubric fit what we are trying to accomplish in assessing student learning?

The group questioned the usability of the VALUE rubric for quantitative literacy. There are many phrases or descriptors that could be considered confusing to a reviewer who is in a different discipline. Do all of the performance indicators need to be used in a review of artifacts from the natural sciences? Should quantitative literacy be assessed outside disciplines that specifically measure mathematical formulas or numerical representations of information?

Second session, November 17, 2016

In Attendance: Dave Weinberg, Tim D'Andrea, Susan Longest, Kelly Craig, Shawn Robinson, Suzanne Lay, Kelly O'Connell, Bette Schans

Tim presented information from the CDHE regarding the use of the AAC&U VALUE rubric. Apparently the state has approved two performance indicators (Interpretation and Representation) for assessing the Natural Sciences and requires assessment of 5/6 indicators for Mathematics (the sixth indicator is used for statistics). The group recommended starting with the two that are approved for the Biology lab assignment that Susan and the other instructors are doing for assessment. We will start the pilot assessment with the first two indicators on the rubric.

The group suggested that instructors from other disciplines be included in the pilot assessment.

Pilot session, December 14, 2016

In attendance: Dave Weinberg, Tim D'Andrea, Susan Longest, Shawn Robinson, Olga Grisak, Robin Calland, Kelly O'Connell, Bette Schans

Olga Grisak from Radiologic Technology and Robin Calland from English joined the group for the assessment. The assignment used for assessment was a Biology 101 lab report. The group used the AAC&U VALUE rubric as well as a revised rubric from The National Science Foundation (Quantitative Reasoning in the Contemporary World 3: Assessing Student Learning <http://services.bepress.com/numeracy/>). The first two performance indicators (Interpretation and Representation) were assessed for this session. The session began with a calibration of 2 artifacts. Two observations were made during the calibration:

1. It is necessary to have the assignment and any results such as data tables or correct answers. Without that information, it is difficult to determine if the students are interpreting and/or representing the information correctly.
2. Some of the wording in both rubrics was unclear. The group will meet again to combine the wording of each into a CMU VALUE rubric.

AAC&U Value Rubric.

	Capstone 4	Milestones 3 2 1		
Interpretation <i>Ability to explain information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, words)</i>	Provides accurate explanations of information presented in mathematical forms. Makes appropriate inferences based on that information. <i>For example, accurately explains the trend data shown in a graph and makes reasonable predictions regarding what the data suggest about future events.</i>	Provides accurate explanations of information presented in mathematical forms. <i>For instance, accurately explains the trend data shown in a graph.</i>	Provides somewhat accurate explanations of information presented in mathematical forms, but occasionally makes minor errors related to computations or units. <i>For instance, accurately explains trend data shown in a graph, but may miscalculate the slope of the trend line.</i>	Attempts to explain information presented in mathematical forms, but draws incorrect conclusions about what the information means. <i>For example, attempts to explain the trend data shown in a graph, but will frequently misinterpret the nature of that trend, perhaps by confusing positive and negative trends.</i>
Representation <i>Ability to convert relevant information into various mathematical forms (e.g., equations, graphs, diagrams, tables, words)</i>	Skillfully converts relevant information into an insightful mathematical portrayal in a way that contributes to a further or deeper understanding.	Competently converts relevant information into an appropriate and desired mathematical portrayal.	Completes conversion of information but resulting mathematical portrayal is only partially appropriate or accurate.	Completes conversion of information but resulting mathematical portrayal is inappropriate or inaccurate.

Revised Rubric	Achievement Level			
	3	2	1	0
Quantitative Literacy Core Competency				
Interpretation <i>Ability to glean and explain mathematical information presented in various forms (e.g. equations, graphs, diagrams, tables, words)</i>	Correctly identifies all relevant information.	Correctly identifies some, but not all, relevant information.	Some relevant information is identified, but none is correct.	No relevant information identified.

Representation <i>Ability to convert information from one mathematical form (e.g. equations, graphs, diagrams, tables, words) into another.</i>	All relevant conversions are present and correct.	Some correct and relevant conversions are present but some conversions are incorrect or not present.	Some information is converted, but it is irrelevant or incorrect.	No conversion is attempted.
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The average of the scores of the AAC&U VALUE Rubric in Interpretation was 2.31/4.

The average of the scores for the revised rubric in Interpretation was 1.99/3.

The average of the scores of the AAC&U VALUE Rubric in Representation was 2.13/4.

The average of the scores for the revised rubric in Representation was 1.86/3.

The group determined that a revision would be in order using both of the rubrics and then we would ask for artifacts from the Physical and Environmental Sciences in the spring semester. We will meet again early in February.

A revision combining both rubrics was presented in December:

Quantitative Literacy Core Competency	Achievement Level				
	4	3	2	1	0
Interpretation <i>Ability to explain information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, words)</i>	Accurately and completely explains relevant information presented in mathematical forms. Makes appropriate inferences based on that information.	Accurately and completely explains relevant information presented in mathematical forms	For the most part, accurately explains relevant information presented in mathematical forms.	Accurately explains some relevant information presented in mathematical forms.	No relevant information was explained and/or no explanations were correct.
Representation <i>Ability to convert relevant information into mathematical forms (e.g., equations, graphs, diagrams, tables, words)</i>	Skillfully, accurately, and completely converts relevant information into an insightful mathematical portrayal in a way that contributes to a further or deeper understanding.	Accurately and completely converts relevant information into an appropriate and desirable mathematical portrayal.	For the most part, accurately converts relevant information into an appropriate mathematical portrayal.	Accurately converts some relevant information into a mathematical portrayal that is at least somewhat appropriate.	No relevant information was correctly converted into an even somewhat appropriate mathematical portrayal.

The group determined that the revised rubric should be used for the next review session to be held at the end of the spring semester. Artifacts will be collected from BIOL 101 lab and, perhaps, from Essential Learning math courses.

Artifacts were collected but the group could not find a time to meet at the end of the semester. This assessment will be scheduled for early fall, 2017.

Appendix I

Biological Sciences Program Requirements



2018-2019 PROGRAM REQUIREMENTS

Degree: Bachelor of Science

Major: Biological Sciences

Concentration: Biology

About This Major . . .

The Bachelor of Science degree with a Biological Science major provides a broad background in the biological sciences. Students choose biology courses from four areas: cell, developmental, and molecular biology; anatomical and physiological biology; organismal biology; and ecology, evolution, and systematics. Students wishing to obtain teacher certification complete a concentration in Teacher Licensure. The Biology Concentration also offers field courses on tropical ecosystems in Ecuador and on marine invertebrate communities in Oregon. The Department of Biology operates the only electron microscope facility in the area. Graduates of our program pursue careers in the medical field, plant pathology, wildlife biology, cell biology or biotechnology, among just a few of the career options available with a Biology degree from Colorado Mesa University.

For more information on what you can do with this major, go to <http://www.coloradomesa.edu/career/whatmajor.html>.

All CMU baccalaureate graduates are expected to demonstrate proficiency in critical thinking, communication fluency, quantitative fluency, and specialized knowledge/applied learning. In addition to these campus-wide student learning outcomes, graduates of this major will be able to:

1. Demonstrate a breadth of knowledge in the life sciences with an accompanying depth of knowledge particularly in the key areas of cell and molecular biology, organismal diversity, ecology, evolution and genetics. (Specialized Knowledge)
2. Utilize the scientific approach to address novel questions and problems through the development of hypotheses, design of experiments, collection of data, analysis of data, and interpretation of results. (Quantitative Fluency/Applied Learning)
3. Identify, examine, evaluate and discuss the scientific literature. (Critical Thinking)
4. Articulate biological principles and ideas effectively, both in written and oral form. (Communication Fluency)

Advising Process and DegreeWorks

This document is intended for informational purposes to help determine what courses and associated requirements are needed to earn a degree. The suggested course sequencing outlines how students could finish degree requirements. Some courses are critical to complete in specific semesters, while others may be moved around. Meeting with an academic advisor is essential in planning courses and altering the suggested course sequencing. It is ultimately the student's responsibility to understand and fulfill the requirements for her/his intended degree(s).

DegreeWorks is an online degree audit tool available in MAVzone. It is the official record used by the Registrar's Office to evaluate progress towards a degree and determine eligibility for graduation. Students are responsible for reviewing their DegreeWorks audit on a regular basis and should discuss questions or concerns with their advisor or academic department head. Discrepancies in requirements should be reported to the Registrar's Office.

Graduation Process

Students must complete the following in the first two months of the semester prior to completing their degree requirements:

- Review their DegreeWorks audit and create a plan that outlines how unmet requirements will be met in the final semester.
- Meet with their advisor and modify their plan as needed. The advisor must approve the final plan.
- Submit the "Intent to Graduate" form to the Registrar's Office to officially declare the intended graduation date and commencement ceremony plans.
- Register for all needed courses and complete all requirements for each degree sought.

Submission deadlines and commencement details can be found at <http://www.coloradomesa.edu/registrar/graduation.html>.

If a student's petition for graduation is denied, it will be her/his responsibility to consult the Registrar's Office regarding next steps.

INSTITUTIONAL DEGREE REQUIREMENTS

The following institutional degree requirements apply to all CMU baccalaureate degrees. Specific programs may have different requirements that must be met in addition to institutional requirements.

- 120 semester hours minimum.
- Students must complete a minimum of 30 of the last 60 hours of credit at CMU, with at least 15 semester hours in major discipline courses numbered 300 or higher.
- 40 upper-division credits (an alternative credit limit applies to the Bachelor of Applied Science degree).
- 2.00 cumulative GPA or higher in all CMU coursework.
- A course may only be used to fulfill one requirement for each degree/certificate.
- No more than six semester hours of independent study courses can be used toward the degree.
- Non-traditional credit, such as advanced placement, credit by examination, credit for prior learning, cooperative education and internships, cannot exceed 30 semester credit hours for a baccalaureate degree; A maximum of 15 of the 30 credits may be for cooperative education, internships, and practica.
- Pre-collegiate courses (usually numbered below 100) cannot be used for graduation.
- Capstone exit assessment/projects (e.g., Major Field Achievement Test) requirements are identified under Program-Specific Degree Requirements.
- The Catalog Year determines which program sheet and degree requirements a student must fulfill in order to graduate. Visit with your advisor or academic department to determine which catalog year and program requirements you should follow.
- See “Requirements for Undergraduate Degrees and Certificates” in the catalog for a complete list of graduation requirements.

PROGRAM-SPECIFIC DEGREE REQUIREMENTS

- A “C” or higher is required in all major courses and Foundation courses.
- Foundation courses should be completed by the end of the sophomore year.
- Topics courses (BIOL 196/296/396/496) may not be used as Additional Biology Courses but must be used for elective credit.

ESSENTIAL LEARNING REQUIREMENTS (31 semester hours)

See the current catalog for a list of courses that fulfill the requirements below. If a course is an Essential Learning option and a requirement for your major, you must use it to fulfill the major requirement and make a different selection for the Essential Learning requirement.

English (6 semester hours, must receive a grade of "C" or better and must be completed by the time the student has 60 semester hours.)

- ENGL 111 - English Composition (3)
- ENGL 112 - English Composition (3)

Mathematics (3 semester hours, must receive a grade of "C" or better, must be completed by the time the student has 60 semester hours.)

- MATH 113 - College Algebra (4)* or higher

*3 credits apply to the Essential Learning requirements and 1 credit applies to elective credit.

Professional schools (medical, veterinary, dental) may require one or two semesters of calculus. MATH 151 and MATH 152 will fulfill the Mathematics requirement.

Humanities (3 semester hours)

- Select one Humanities course (3)

Social and Behavioral Sciences (6 semester hours)

- Select one Social and Behavioral Sciences course (3)
- Select one Social and Behavioral Sciences course (3)

Natural Sciences (7 semester hours, one course must include a lab)

- Select one Natural Sciences course (3)
- Select one Natural Sciences course with a lab (4)

History (3 semester hours)

- Select one History course (3)

Fine Arts (3 semester hours)

- Select one Fine Arts course (3)

OTHER LOWER-DIVISION REQUIREMENTS

Wellness Requirement (2 semester hours)

- KINE 100 - Health and Wellness (1)
- Select one Activity course (1)

Essential Learning Capstone (4 semester hours)

Essential Learning Capstone must be taken after completion of the Essential Learning English and Mathematics requirements, and when a student has earned between 45 and 75 hours.

- ESSL 290 - Maverick Milestone (3)
- ESSL 200 - Essential Speech (1)

FOUNDATION COURSES (17 semester hours, must pass all courses with a grade of "C" or higher)

- BIOL 105 - Attributes of Living Systems (3)
- BIOL 105L - Attributes of Living Systems Laboratory (1)
- CHEM 131 - General Chemistry I (4)*
- CHEM 131L - General Chemistry I Lab (1)*
- CHEM 132 - General Chemistry II (4)*
- CHEM 132L - General Chemistry II Lab (1)*
- One of the following courses:

STAT 200 - Probability and Statistics (3)

MATH 146 - Calculus for Biological Sciences (5)**

* A higher-level subject may be taken in the same category with advisor approval.

** If MATH 146 is taken, 3 credits apply to Foundation and 2 credits apply to electives.

BS, BIOLOGICAL SCIENCES, BIOLOGY REQUIREMENTS (48 semester hours, must pass all courses with a grade of "C" or higher)

Core (10 semester hours)

- BIOL 208 - Ecology and Evolution (3)
- BIOL 208L - Ecology and Evolution Laboratory (1)
- BIOL 301 - Principles of Genetics (3)
- BIOL 301L - Principles of Genetics Laboratory (1)
- BIOL 483 - Senior Thesis (2)

Required Related Study Area (18 semester hours)

- BIOL 106 - Principles of Animal Biology (3)
- BIOL 106L - Principles of Animal Biology Laboratory (1)
- BIOL 107 - Principles of Plant Biology (3)
- BIOL 107L - Principles of Plant Biology Laboratory (1)
- PHYS 111 - General Physics (4)*
- PHYS 111L - General Physics Laboratory (1)*
- PHYS 112 - General Physics II (4)*
- PHYS 112L - General Physics II Laboratory (1)*

* A higher-level subject may be taken in the same category with advisor approval.

Additional Biology Courses (20 semester hours)

Select 20 semester hours from at least three of the following four categories. At least 50% must be at the 300-Level or above. At least one of the following must be included: BIOL 302, BIOL 341/341L, or BIOL 421/421L. Topics courses (BIOL 196/296/396/496) may not be used as Additional Biology Courses but must be used for elective credit.

Category 1: Cellular, Developmental, and

Molecular BIOL 302 - Cellular Biology (3)

BIOL 310/310L - Developmental Biology and Laboratory (5)

BIOL 343 - Immunology (3)

BIOL 344/344L - Forensic Molecular Biology and Laboratory (4)

BIOL 371L - Laboratory Investigations in Cellular and Molecular Biology (3)

BIOL 425 - Molecular Genetics (3)

BIOL 442 - Pharmacology (3)

CHEM 315/315L - Biochemistry I and Laboratory (4)

Category 2: Organismal

BIOL 250/250L - Intro to Microbiology and Laboratory (4)

BIOL 316/316L - Animal Behavior and Laboratory (4)

BIOL 322/322L - Plant Identification and Laboratory (4)

BIOL 331/331L - Insect Biology and Laboratory (5)

BIOL 333 - Marine Biology (3)

BIOL 335/335L - Invertebrate Zoology and Laboratory (4)

BIOL 336/336L - Fish Biology and Laboratory (4)

BIOL 350/350L - Microbiology and Laboratory (4)

BIOL 411/411L - Mammalogy and Laboratory (4)

BIOL 412/412L - Ornithology and Laboratory (4)

BIOL 413/413L - Herpetology and Laboratory (4)

BIOL 431/431L - Animal Parasitology and Laboratory (4)

BIOL 433 - Marine Invertebrate Communities (3)

BIOL 450/450L - Mycology and Laboratory (5)

Category 3: Anatomical and Physiological

BIOL 209/209L - Human Anatomy & Physiology I and Laboratory (4)

BIOL 210/210L - Human Anatomy & Physiology II and Laboratory (4)

BIOL 241 - Pathophysiology (4)

- BIOL 341/341L - General Physiology and Laboratory (4)
- BIOL 409/409L - Gross and Developmental Human Anatomy and Laboratory (4)
- BIOL 410/410L - Human Osteology and Laboratory (4)
- BIOL 421/421L - Plant Physiology and Laboratory (4)
- BIOL 423/423L - Plant Anatomy and Laboratory (5)
- BIOL 441 - Endocrinology (3)

Category 4: Ecology, Evolution, and Systematics

- BIOL 211/211L - Ecosystem Biology and Laboratory (5)
- BIOL 315 - Epidemiology (3)
- BIOL 320 - Plant Systematics (3)
- BIOL 321/321L - Taxonomy of Grasses and Laboratory (4)
- BIOL 403 - Evolution (3)
- BIOL 405/405L - Adv. Ecological Methods and Laboratory (5)
- BIOL 406 - Plant-Animal Interactions (3)
- BIOL 407 - Tropical Field Biology (3-5)
- BIOL 408 - Desert Ecology (3)
- BIOL 414/414L - Freshwater Ecology and Laboratory (4)
- BIOL 415 - Tropical Ecosystems (2)
- BIOL 418/418L - Wildlife Management and Laboratory (5)

GENERAL ELECTIVES (All college level courses appearing on your final transcript, not listed above that will bring your total semester hours to 120 hours, including 40 upper-division credit hours. 18 semester hours; up to 24 hours of upper-division may be needed. It is strongly recommended that all electives be upper-division. Professional schools (medical, veterinary, dental) may require one or two semesters of organic chemistry, which may be taken to fulfill part of electives.)

- MATH 113 - College Algebra (1)

SUGGESTED COURSE

SEQUENCING

Freshman Year, Fall Semester: 15 credits

- BIOL 105 - Attributes of Living Systems (3) and BIOL 105L - Attributes of Living Systems Laboratory (1)
- CHEM 131 - General Chemistry I (4) and CHEM 131L - General Chemistry I Laboratory (1)
- KINA Activity (1)
- KINE 100 - Health and Wellness (1)
- MATH 113 - College Algebra (4)

Freshman Year, Spring Semester: 17 credits

- BIOL 106 - Principles of Animal Biology (3) and BIOL 106L - Principles of Animal Biology Laboratory(1)
- CHEM 132 - General Chemistry II (4) and CHEM 132L - General Chemistry II Laboratory (1)
- Essential Learning - Fine Arts (3)
- STAT 200 - Probability and Statistics (3) or MATH 146 - Calculus for Biological Sciences (5)

Sophomore Year, Fall Semester: 15 credits

- BIOL 107 - Principles of Plant Biology (3) and BIOL 107L - Principles of Plant Biology Laboratory(1)
- ENGL 111 - English Composition (3)
- Essential Learning - Social and Behavioral Sciences (3)
- PHYS 111 - General Physics (4) and PHYS 111L - General Physics Laboratory (1)

Sophomore Year, Spring Semester: 15 credits

- BIOL 208 - Ecology and Evolution (3) or BIOL 208L - Ecology and Evolution Laboratory(1)
- ENGL 112 - English Composition (3)
- Essential Learning - History (3)
- PHYS 112 - General Physics II (4) and PHYS 112L - General Physics II Laboratory (1)

Junior Year, Fall Semester: 15 credits

- Additional Biology Courses (2 courses) (7)
- BIOL 301 - Principles of Genetics (3) or BIOL 301L - Principles of Genetics Laboratory(1)
- ESSL 290 - Maverick Milestone (3)
- ESSL 200 - Essential Speech (1)

Junior Year, Spring Semester: 16 credits

- Additional Biology Courses (2 courses) (7)
- Essential Learning - Social and Behavioral Sciences (3)
- Essential Learning - Humanities (3)
- General Elective (3)

Senior Year, Fall Semester: 15 credits

- Additional Biology Courses (2 courses) (6)
- Essential Learning - Natural Science (3)
- General Electives (2 courses) (6)

Senior Year, Spring Semester: 12-14 credits

- BIOL 483 - Senior Thesis (2)
 - Essential Learning - Natural Science with Lab (4)
 - General Electives (2-3 courses) (6-8)
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2018-2019 PROGRAM REQUIREMENTS

Degree: Bachelor of Science

Major: Biological Sciences

Concentration: Cellular, Molecular, and Developmental Biology

About This Major . . .

The Bachelor of Science degree with a Biological Sciences major provides a broad background in the biological sciences. Students choose biology courses from four categories: cellular, molecular, and developmental biology; anatomical and physiological biology; organismal biology; and ecology, evolution, and systematics. The Cellular, Molecular, and Developmental Biology Concentration will provide a solid background in cell and molecular biology, genetics, and biochemistry. The concentration prepares graduates of this program for careers in the medical field, cell biology, and biotechnology, which are just a few of the career options available.

For more information on what you can do with this major, go to <http://www.coloradomesa.edu/career/whatmajor.html>

All CMU baccalaureate graduates are expected to demonstrate proficiency in critical thinking, communication fluency, quantitative fluency, and specialized knowledge/applied learning. In addition to these campus-wide student learning outcomes, graduates of this major will be able to:

1. Demonstrate a breadth of knowledge in the life sciences with an accompanying depth of knowledge particularly in the key areas of cell and molecular biology, ecology, evolution, and genetics. (Specialized Knowledge)
2. Utilize the scientific approach to address novel questions and problems through the development of hypotheses, design of experiments, collection of data, analysis of data, and interpretation of results. (Quantitative Fluency/Applied Learning)
3. Identify, examine, evaluate, and discuss the scientific literature. (Critical Thinking)
4. Articulate biological principles and ideas effectively, both in written and oral form. (Communication Fluency)

Advising Process and DegreeWorks

This document is intended for informational purposes to help determine what courses and associated requirements are needed to earn a degree. The suggested course sequencing outlines how students could finish degree requirements. Some courses are critical to complete in specific semesters, while others may be moved around. Meeting with an academic advisor is essential in planning courses and altering the suggested course sequencing. It is ultimately the student's responsibility to understand and fulfill the requirements for her/his intended degree(s).

DegreeWorks is an online degree audit tool available in MAVzone. It is the official record used by the Registrar's Office to evaluate progress towards a degree and determine eligibility for graduation. Students are responsible for reviewing their DegreeWorks audit on a regular basis and should discuss questions or concerns with their advisor or academic department head. Discrepancies in requirements should be reported to the Registrar's Office.

Graduation Process

Students must complete the following in the first two months of the semester prior to completing their degree requirements:

- Review their DegreeWorks audit and create a plan that outlines how unmet requirements will be met in the final semester.
- Meet with their advisor and modify their plan as needed. The advisor must approve the final plan.
- Submit the "Intent to Graduate" form to the Registrar's Office to officially declare the intended graduation date and commencement ceremony plans.
- Register for all needed courses and complete all requirements for each degree sought.

Submission deadlines and commencement details can be found at <http://www.coloradomesa.edu/registrar/graduation.html>.

If a student's petition for graduation is denied, it will be her/his responsibility to consult the Registrar's Office regarding next steps.

INSTITUTIONAL DEGREE REQUIREMENTS

The following institutional degree requirements apply to all CMU baccalaureate degrees. Specific programs may have different requirements that must be met in addition to institutional requirements.

- 120 semester hours minimum.
- Students must complete a minimum of 30 of the last 60 hours of credit at CMU, with at least 15 semester hours in major discipline courses numbered 300 or higher.
- 40 upper-division credits (an alternative credit limit applies to the Bachelor of Applied Science degree).
- 2.00 cumulative GPA or higher in all CMU coursework.
- A course may only be used to fulfill one requirement for each degree/certificate.
- No more than six semester hours of independent study courses can be used toward the degree.
- Non-traditional credit, such as advanced placement, credit by examination, credit for prior learning, cooperative education and internships, cannot exceed 30 semester credit hours for a baccalaureate degree; A maximum of 15 of the 30 credits may be for cooperative education, internships, and practica.
- Pre-collegiate courses (usually numbered below 100) cannot be used for graduation.
- Capstone exit assessment/projects (e.g., Major Field Achievement Test) requirements are identified under Program-Specific Degree Requirements.
- The Catalog Year determines which program sheet and degree requirements a student must fulfill in order to graduate. Visit with your advisor or academic department to determine which catalog year and program requirements you should follow.
- See “Requirements for Undergraduate Degrees and Certificates” in the catalog for a complete list of graduation requirements.

PROGRAM-SPECIFIC DEGREE REQUIREMENTS

- A “C” or higher is required in all major courses and Foundation courses.
- Foundation courses should be completed by the end of the sophomore year.
- Topics courses (BIOL 196/296/396/496) as well as research courses (BIOL 387/487), internships (BIOL 499), teaching practicum (BIOL 493), and independent study (BIOL 495) may not be used as Additional Biology Courses but must be used for elective credit.

ESSENTIAL LEARNING REQUIREMENTS (31 semester hours)

See the current catalog for a list of courses that fulfill the requirements below. If a course is an Essential Learning option and a requirement for your major, you must use it to fulfill the major requirement and make a different selection for the Essential Learning requirement.

English (6 semester hours, must receive a grade of "C" or better and must be completed by the time the student has 60 semester hours.)

- ENGL 111 - English Composition (3)
- ENGL 112 - English Composition (3)

Mathematics (3 semester hours, must receive a grade of "C" or better, must be completed by the time the student has 60 semester hours.)

- MATH 151 - Calculus I (5)

3 credits apply to the Essential Learning requirements and 2 credits apply to elective credit.

Humanities (3 semester hours)

- Select one Humanities course (3)

Social and Behavioral Sciences (6 semester hours)

- Select one Social and Behavioral Sciences course (3)
- Select one Social and Behavioral Sciences course (3)

Natural Sciences (7 semester hours, one course must include a lab)

- Select one Natural Sciences course (3)
- Select one Natural Sciences course with a lab (4)

CHEM 131/131L and CHEM 132/132L are recommended. Both are prerequisites for upper level chemistry. If chosen, 7 credits apply to the Essential Learning requirement and 3 credits apply to electives.

History (3 semester hours)

- Select one History course (3)

Fine Arts (3 semester hours)

- Select one Fine Arts course (3)

OTHER LOWER-DIVISION REQUIREMENTS

Wellness Requirement (2 semester hours)

- KINE 100 - Health and Wellness (1)
- Select one Activity course (1)

Essential Learning Capstone (4 semester hours)

Essential Learning Capstone must be taken after completion of the Essential Learning English and Mathematics requirements, and when a student has earned between 45 and 75 hours.

- ESSL 290 - Maverick Milestone (3)
- ESSL 200 - Essential Speech (1)

FOUNDATION COURSES (17-19 semester hours, must pass all courses with a grade of "C" or higher)

- BIOL 105 - Attributes of Living Systems (3)
- BIOL 105L - Attributes of Living Systems Laboratory (1)
- PHYS 111 - General Physics I (4)*
- PHYS 111L - General Physics I Laboratory (1)*
- PHYS 112 - General Physics II (4)*
- PHYS 112 - General Physics II Laboratory (1)*
- One of the following courses:

STAT 200 - Probability and Statistics (3) MATH 152 - Calculus II (5)

* A higher-level subject can be taken in the same category with advisor approval.

BS, BIOLOGICAL SCIENCES, BIOLOGY REQUIREMENTS (53 semester hours, must pass all courses with a grade of "C" or higher)

Core (10 semester hours)

- BIOL 208 - Fundamentals of Ecology and Evolution (3)
- BIOL 208L - Fundamentals of Ecology and Evolution Laboratory (1)
- BIOL 301 - Principles of Genetics (3)
- BIOL 301L - Principles of Genetics Laboratory (1)
- BIOL 483 - Senior Thesis (2)

Required Related Study Area (31 semester hours)

- BIOL 108 - Diversity of Organisms (3) and BIOL 108L - Diversity of Organisms Laboratory (1)
- BIOL 302 - Cellular Biology (3)
- BIOL 310 - Developmental Biology (3)
- BIOL 310L - Developmental Biology Laboratory (2)
- BIOL 371L - Laboratory Investigations in Cellular and Molecular Biology (3)
- BIOL 425 - Molecular Genetics (3)
- CHEM 311 - Organic Chemistry I (4)*
- CHEM 311L - Organic Chemistry I Laboratory (1)*
- CHEM 312 - Organic Chemistry II (4)*
- CHEM 312L - Organic Chemistry II Laboratory (1)*
- CHEM 315 - Biochemistry I (3)

* CHEM 311/311L and CHEM 312/312L require CHEM 131/131L and CHEM 132/132L as prerequisites. Students should take CHEM 131/131L and CHEM 132/132L for Essential Learning Natural Sciences.

Additional Biology Courses (12 semester hours)

Select 12 semester hours from the following lists. Topics courses (BIOL 196/296/396/496) may not be used as Additional Biology Courses but must be used for elective credit.

Category 1: Cellular, Developmental, and

Molecular BIOL 343 - Immunology (3)

BIOL 344/344L - Forensic Molecular Biology and Laboratory (4)

BIOL 442 - Pharmacology (3)

CHEM 315L - Biochemistry I Laboratory (1)

CHEM 316 - Biochemistry II (3)

Category 2: Organismal

BIOL 250/250L - Intro to Microbiology and Laboratory (4)

BIOL 316/316L - Animal Behavior and Laboratory (4)

BIOL 322/322L - Plant Identification and Laboratory (4)

BIOL 331/331L - Insect Biology and Laboratory (5)

BIOL 333 - Marine Biology (3)

BIOL 335/335L - Invertebrate Zoology and Laboratory (4)

BIOL 336/336L - Fish Biology and Laboratory (4)

BIOL 350/350L - Microbiology and Laboratory (4)

BIOL 411/411L - Mammalogy and Laboratory (4)

BIOL 412/412L - Ornithology and Laboratory (4)

BIOL 413/413L - Herpetology and Laboratory (4)

BIOL 431/431L - Animal Parasitology and Laboratory (4)

BIOL 433 - Marine Invertebrate Communities (3)

BIOL 450/450L - Mycology and Laboratory (5)

Category 3: Anatomical and Physiological

BIOL 209/209L - Human Anatomy & Physiology I and Laboratory (4)

BIOL 210/210L - Human Anatomy & Physiology II and Laboratory (4)

BIOL 241 - Pathophysiology (4)

BIOL 341/341L - General Physiology and Laboratory (4)

BIOL 409/409L - Gross and Developmental Human Anatomy and Laboratory (4)

- BIOL 410/410L - Human Osteology and Laboratory (4)
- BIOL 421/421L - Plant Physiology and Laboratory (4)
- BIOL 423/423L - Plant Anatomy and Laboratory (5)
- BIOL 441 - Endocrinology (3)

Category 4: Ecology, Evolution, and Systematics

- BIOL 211/211L - Ecosystem Biology and Laboratory (5)
- BIOL 315 - Epidemiology (3)
- BIOL 320 - Plant Systematics (3)
- BIOL 321/321L - Taxonomy of Grasses and Laboratory (4)
- BIOL 403 - Evolution (3)
- BIOL 405/405L - Advanced Ecological Methods and Laboratory (5)
- BIOL 406 - Plant-Animal Interactions (3)
- BIOL 407 - Tropical Field Biology (3-5)
- BIOL 408 - Desert Ecology (3)
- BIOL 414/414L - Freshwater Ecology and Laboratory (4)
- BIOL 415 - Tropical Ecosystems (2)
- BIOL 418/418L - Wildlife Management and Laboratory (5)

GENERAL ELECTIVES (All college level courses appearing on your final transcript, not listed above that will bring your total semester hours to 120 hours, including 40 upper-division hours. 11-13 semester hours; up to 7 hours of upper division may be needed.

Research courses are recommended.)

CHEM 131/131L/132/132L (3)

MATH 151 - Calculus I (2)

SUGGESTED COURSE

SEQUENCING

Freshman Year, Fall Semester: 15 credits

- BIOL 105 - Attributes of Living Systems (3) and BIOL 105L - Attributes of Living Systems Laboratory (1)
- CHEM 131 - General Chemistry (4) and CHEM 131L - General Chemistry Laboratory (1)
- KINE 100 - Health and Wellness (1)
- MATH 151 - Calculus I (5)

Freshman Year, Spring Semester: 17 credits

- BIOL 108 - Diversity of Organisms (3) and BIOL 108L - Diversity of Organisms Laboratory (1)
 - CHEM 132 - General Chemistry II (4) and CHEM 132L - General Chemistry II Laboratory (1)
 - ENGL 111 - English Composition (3)
 - STAT 200 - Probability and Statistics (3) or MATH 152 - Calculus II (5)
-

Sophomore Year, Fall Semester: 15 credits

- BIOL 208 - Ecology and Evolution (3) or BIOL 208L - Ecology and Evolution Laboratory (1)
- CHEM 311 - Organic Chemistry I (4) and CHEM 311L - Organic Chemistry I Laboratory (1)
- ENGL 112 - English Composition (3)
- Essential Learning - Social and Behavioral Sciences (3)

Sophomore Year, Spring Semester: 15 credits

- BIOL 301 - Principles of Genetics (3) and BIOL 301L - Principles of Genetics Laboratory (1)
 - CHEM 312 - Organic Chemistry II (4) and CHEM 312L - Organic Chemistry II Laboratory (1)
 - Essential Learning - History (3)
 - Essential Learning - Humanities (3)
-

Junior Year, Fall Semester: 15 credits

- BIOL 302 - Cellular Biology (3)
- CHEM 315 - Biochemistry I (3)
- ESSL 290 - Maverick Milestone (3)
- ESSL 200 - Essential Speech (1)
- PHYS 111 - General Physics (4) and PHYS 111L - General Physics Laboratory (1)

Junior Year, Spring Semester: 14 credits

- BIOL 310 - Developmental Biology (3) and BIOL 310L - Developmental Biology Laboratory (2)
 - Essential Learning - Social and Behavioral Sciences (3)
 - KINA Activity (1)
 - PHYS 112 - General Physics II (4) and PHYS 112L - General Physics II Laboratory (1)
-

Senior Year, Fall Semester: 15 credits

- Additional Biology Course (4)
- BIOL 371L - Laboratory Investigations in Cellular and Molecular Biology (3)
- General Electives (2 courses) (5)
- Essential Learning - Fine Arts (3)

Senior Year, Spring Semester: 14-16 credits

- Additional Biology Courses (8)
 - BIOL 425 - Molecular Genetics (3)
 - BIOL 483 - Senior Thesis (2)
 - General Elective (1-3)
-



2018-2019 PROGRAM REQUIREMENTS

Degree: Bachelor of Science

Major: Biological Sciences

Concentration: Ecology, Evolution, and Organismal Biology

About This Major . . .

The Bachelor of Science degree with a Biological Sciences major provides a broad background in the biological sciences. Students choose biology courses from four categories: cellular, molecular, and developmental biology; anatomical and physiological biology; organismal biology; and ecology, evolution, and systematics. The Ecology, Evolution, and Organismal Biology Concentration will provide a solid background in ecology and evolution, and offers field courses in a variety of areas, in addition to internships and research opportunities. Graduates of this program may pursue careers in ecology, plant biology, fish and wildlife biology, and evolutionary biology, which are just a few of the career options available.

For more information on what you can do with this major, go to <http://www.coloradomesa.edu/career/whatmajor.html>

All CMU baccalaureate graduates are expected to demonstrate proficiency in critical thinking, communication fluency, quantitative fluency, and specialized knowledge/applied learning. In addition to these campus-wide student learning outcomes, graduates of this major will be able to:

1. Demonstrate a breadth of knowledge in the life sciences with an accompanying depth of knowledge particularly in the key areas of organismal diversity, ecology, evolution, and genetics. (Specialized Knowledge)
2. Utilize the scientific approach to address novel questions and problems through the development of hypotheses, design of experiments, collection of data, analysis of data, and interpretation of results. (Quantitative Fluency/Applied Learning)
3. Identify, examine, evaluate, and discuss the scientific literature. (Critical Thinking)
4. Articulate biological principles and ideas effectively, both in written and oral form. (Communication Fluency)

Advising Process and DegreeWorks

This document is intended for informational purposes to help determine what courses and associated requirements are needed to earn a degree. The suggested course sequencing outlines how students could finish degree requirements. Some courses are critical to complete in specific semesters, while others may be moved around. Meeting with an academic advisor is essential in planning courses and altering the suggested course sequencing. It is ultimately the student's responsibility to understand and fulfill the requirements for her/his intended degree(s).

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Graduation Process

Students must complete the following in the first two months of the semester prior to completing their degree requirements:

- Review their DegreeWorks audit and create a plan that outlines how unmet requirements will be met in the final semester.
- Meet with their advisor and modify their plan as needed. The advisor must approve the final plan.
- Submit the "Intent to Graduate" form to the Registrar's Office to officially declare the intended graduation date and commencement ceremony plans.
- Register for all needed courses and complete all requirements for each degree sought.

Submission deadlines and commencement details can be found at <http://www.coloradomesa.edu/registrar/graduation.html>.

If a student's petition for graduation is denied, it will be her/his responsibility to consult the Registrar's Office regarding next steps.

INSTITUTIONAL DEGREE REQUIREMENTS

The following institutional degree requirements apply to all CMU baccalaureate degrees. Specific programs may have different requirements that must be met in addition to institutional requirements.

- 120 semester hours minimum.
- Students must complete a minimum of 30 of the last 60 hours of credit at CMU, with at least 15 semester hours in major discipline courses numbered 300 or higher.
- 40 upper-division credits (an alternative credit limit applies to the Bachelor of Applied Science degree).
- 2.00 cumulative GPA or higher in all CMU coursework.
- A course may only be used to fulfill one requirement for each degree/certificate.
- No more than six semester hours of independent study courses can be used toward the degree.
- Non-traditional credit, such as advanced placement, credit by examination, credit for prior learning, cooperative education and internships, cannot exceed 30 semester credit hours for a baccalaureate degree; A maximum of 15 of the 30 credits may be for cooperative education, internships, and practica.
- Pre-collegiate courses (usually numbered below 100) cannot be used for graduation.
- Capstone exit assessment/projects (e.g., Major Field Achievement Test) requirements are identified under Program-Specific Degree Requirements.
- The Catalog Year determines which program sheet and degree requirements a student must fulfill in order to graduate. Visit with your advisor or academic department to determine which catalog year and program requirements you should follow.
- See “Requirements for Undergraduate Degrees and Certificates” in the catalog for a complete list of graduation requirements.

PROGRAM-SPECIFIC DEGREE REQUIREMENTS

- A “C” or higher is required in all major courses and Foundation courses.
- Foundation courses should be completed by the end of the sophomore year.
- Topics courses (BIOL 196/296/396/496) as well as research courses (BIOL 387/487), internships (BIOL 499), teaching practicums (BIOL 493), and independent study (BIOL 495) may not be used as Additional Biology Courses but must be used for elective credit.

ESSENTIAL LEARNING REQUIREMENTS (31 semester hours)

See the current catalog for a list of courses that fulfill the requirements below. If a course is an Essential Learning option and a requirement for your major, you must use it to fulfill the major requirement and make a different selection for the Essential Learning requirement.

English (6 semester hours, must receive a grade of "C" or better and must be completed by the time the student has 60 semester hours.)

- ENGL 111 - English Composition (3)
- ENGL 112 - English Composition (3)

Mathematics (3 semester hours, must receive a grade of "C" or better, must be completed by the time the student has 60 semester hours.)

- MATH 113 - College Algebra (3) or higher

3 credits apply to the Essential Learning requirements and 1 credit applies to elective credit.

Humanities (3 semester hours)

- Select one Humanities course (3)

Social and Behavioral Sciences (6 semester hours)

- Select one Social and Behavioral Sciences course (3)
- Select one Social and Behavioral Sciences course (3)

Natural Sciences (7 semester hours, one course must include a lab)

- Select one Natural Sciences course (3)
- Select one Natural Sciences course with a lab (4)

PHYS 112/112L is typically required for admission to graduate schools. If chosen, 4 credits apply to the Essential Learning requirement and 1 credit applies to elective credit.

History (3 semester hours)

- Select one History course (3)

Fine Arts (3 semester hours)

- Select one Fine Arts course (3)

OTHER LOWER-DIVISION REQUIREMENTS

Wellness Requirement (2 semester hours)

- KINE 100 - Health and Wellness (1)
- Select one Activity course (1)

Essential Learning Capstone (4 semester hours)

Essential Learning Capstone must be taken after completion of the Essential Learning English and Mathematics requirements, and when a student has earned between 45 and 75 hours.

- ESSL 290 - Maverick Milestone (3)
- ESSL 200 - Essential Speech (1)

FOUNDATION COURSES (17-19 semester hours, must pass all courses with a grade of "C" or higher)

- BIOL 105 - Attributes of Living Systems (3)
- BIOL 105L - Attributes of Living Systems Laboratory (1)
- CHEM 131 - General Chemistry I (4)*
- CHEM 131L - General Chemistry I Laboratory (1)*
- CHEM 132 - General Chemistry II (4)*
- CHEM 132L - General Chemistry II Laboratory (1)*
- One of the following courses:

STAT 200 - Probability and Statistics (3)** MATH 151 - Calculus I (5)**

* A higher-level subject may be taken in the same category with advisor approval. Organic Chemistry may be required for admission to some graduate programs.

** Statistics and Calculus may be required for admission to some graduate programs.

BS, BIOLOGICAL SCIENCES, BIOLOGY REQUIREMENTS (51 semester hours, must pass all courses with a grade of "C" or higher)

Core (10 semester hours)

- BIOL 208 - Fundamentals of Ecology and Evolution (3)
- BIOL 208L - Fundamentals of Ecology and Evolution Laboratory (1)
- BIOL 301 - Principles of Genetics (3)
- BIOL 301L - Principles of Genetics Laboratory (1)
- BIOL 483 - Senior Thesis (2)

Required Related Study Area (21 semester hours)

- BIOL 106 - Principles of Animal Biology (3)
- BIOL 106L - Principles of Animal Biology Laboratory (1)
- BIOL 107 - Principles of Plant Biology (3)
- BIOL 107L - Principles of Plant Biology Laboratory (1)
- BIOL 403 - Evolution (3)
- BIOL 405 - Advanced Ecological Methods (3)
- BIOL 405L - Advanced Ecological Methods Laboratory (2)
- PHYS 111 - General Physics (4)
- PHYS 111L - General Physics Laboratory (1)

Additional Biology Courses (20 semester hours)

Select 20 semester hours, chosen from the lists below. At least 16 hours must be 300-level or above. Topics courses (BIOL 196/296/396/496) may not be used as Additional Biology Courses but must be used for elective credit.

Category 1: Cellular, Developmental, and

Molecular BIOL 302 - Cellular Biology (3)

BIOL 310/310L - Developmental Biology and Laboratory (5)

BIOL 343 - Immunology (3)

BIOL 344/344L - Forensic Molecular Biology and Laboratory (4)

BIOL 371L - Laboratory Investigations in Cellular and Molecular Biology (3)

BIOL 425 - Molecular Genetics (3)

BIOL 442 - Pharmacology (3)

CHEM 315/315L - Biochemistry I and Laboratory (4)

CHEM 316 - Biochemistry II (3)

Category 2: Organismal

BIOL 250/250L - Intro to Microbiology and Laboratory (4)

BIOL 316/316L - Animal Behavior and Laboratory (4)

BIOL 322/322L - Plant Identification and Laboratory (4)

BIOL 331/331L - Insect Biology and Laboratory (5)

BIOL 333 - Marine Biology (3)

BIOL 335/335L - Invertebrate Zoology and Laboratory (4)

BIOL 336/336L - Fish Biology and Laboratory (4)

BIOL 350/350L - Microbiology and Laboratory (4)

BIOL 411/411L - Mammalogy and Laboratory (4)

BIOL 412/412L - Ornithology and Laboratory (4)

BIOL 413/413L - Herpetology and Laboratory (4)

BIOL 431/431L - Animal Parasitology and Laboratory (4)

BIOL 433 - Marine Invertebrate Communities (3)

BIOL 450/450L - Mycology and Laboratory (5)

Category 3: Anatomical and Physiological

BIOL 209/209L - Human Anatomy & Physiology I and Laboratory (4)

BIOL 210/210L - Human Anatomy & Physiology II and Laboratory (4)

BIOL 241 - Pathophysiology (4)

BIOL 341/341L - General Physiology and Laboratory (4)

- BIOL 409/409L - Gross and Developmental Human Anatomy and Laboratory (4)
- BIOL 410/410L - Human Osteology and Laboratory (4)
- BIOL 421/421L - Plant Physiology and Laboratory (4)
- BIOL 423/423L - Plant Anatomy and Laboratory (5)
- BIOL 441 - Endocrinology (3)

Category 4: Ecology, Evolution, and Systematics

- BIOL 211/211L - Ecosystem Biology and Laboratory (5)
- BIOL 315 - Epidemiology (3)
- BIOL 320 - Plant Systematics (3)
- BIOL 321/321L - Taxonomy of Grasses and Laboratory (4)
- BIOL 406 - Plant-Animal Interactions (3)
- BIOL 407 - Tropical Field Biology (3-5)
- BIOL 408 - Desert Ecology (3)
- BIOL 414/414L - Freshwater Ecology and Laboratory (4)
- BIOL 415 - Tropical Ecosystems (2)
- BIOL 418/418L - Wildlife Management and Laboratory (5)
- GEOL 305 - Cartography for GIS (1)
- GEOG 131 - Introduction to Cartography (3)
- GIST 332/332L - Introduction to GIS and Laboratory (3)

GENERAL ELECTIVES (All college level courses appearing on your final transcript, not listed above that will bring your total semester hours to 120 hours, including 40 upper-division hours. 13-15 semester hours; up to 10 hours of upper division may be needed. BIOL 499 Internship or research courses are recommended.)

- MATH 113 - College Algebra (1)

SUGGESTED COURSE

SEQUENCING

Freshman Year, Fall Semester: 14 credits

- BIOL 105 - Attributes of Living Systems (3) and BIOL 105L - Attributes of Living Systems Laboratory (1)
- CHEM 131 - General Chemistry I (4) and CHEM 131L - General Chemistry I Laboratory (1)
- KINE 100 - Health and Wellness (1)
- MATH 113 - College Algebra (4)

Freshman Year, Spring Semester: 15-17 credits

- BIOL 106 - Principles of Animal Biology (3) and BIOL 106L - Principles of Animal Biology Laboratory(1)
- CHEM 132 - General Chemistry II (4) and CHEM 132L - General Chemistry II Laboratory (1)
- ENGL 111 - English Composition (3)
- STAT 200 - Probability and Statistics (3) or MATH 151 - Calculus I(5)

Sophomore Year, Fall Semester: 15 credits

- BIOL 107 - Principles of Plant Biology (3) and BIOL 107L - Principles of Plant Biology Laboratory(1)
- ENGL 112 - English Composition (3)
- Essential Learning - Social and Behavioral Sciences (3)
- PHYS 111 - General Physics (4) and PHYS 111L - General Physics Laboratory (1)

Sophomore Year, Spring Semester: 14 credits

- BIOL 208 - Ecology and Evolution (3) and BIOL 208L - Ecology and Evolution Laboratory(1)
- BIOL 301 - Principles of Genetics (3) and BIOL 301L - Principles of Genetics Laboratory (1)
- KINA Activity (1)
- PHYS 112 - General Physics II (4) and PHYS 112L - General Physics II Laboratory (1)

Junior Year, Fall Semester: 16 credits

- Additional Biology Courses (6)
- BIOL 403 - Evolution (3)
- Essential Learning - History (3)
- ESSL 290 - Maverick Milestone (3)
- ESSL 200 - Essential Speech (1)

Junior Year, Spring Semester: 15 credits

- BIOL 405 - Advanced Ecological Methods (3) and BIOL 405L - Advanced Ecological Methods Laboratory (2)
- Essential Learning - Social and Behavioral Sciences (3)
- Essential Learning - Humanities (3)
- General Electives (4)

Senior Year, Fall Semester: 16 credits

- Additional Biology Courses (7)
- Essential Learning - Fine Arts (3)
- Essential Learning - Natural Science (3)
- General Elective (3)

Senior Year, Spring Semester: 13-15 credits

- Additional Biology Courses (7)
 - BIOL 483 - Senior Thesis (2)
 - General Electives (4-6)
-



2018-2019 PROGRAM REQUIREMENTS
Degree: Bachelor of Science Major: Biological Sciences
Concentration: Biology, Secondary Education

About This Major . . .

The Biology program offers coursework, in conjunction with the Center for Teacher Education, leading to licensure in secondary education science. Graduates of the program can teach in the state of Colorado or use their teaching expertise in other careers. After completing foundation sciences classes in Biology, Chemistry, Physics and Geology, students choose 10 hours of upper level Biology course work, in consultation with their advisor.

The secondary licensure program provides teacher education candidates with broad content knowledge in science and prepares them as teachers for grades 7 through 12. A minimum of 75 credit hours of Essential Learning and content area coursework must be completed with a minimum GPA of 2.80 before a candidate may apply for admission to the Center for Teacher Education secondary licensure program. Please see the Teacher Education Admission Packet for further information on admissions criteria. EDUC 115, What It Means to be an Educator, and EDUC 215, Teaching as a Profession, must be taken before applying to the program.

For more information on what you can do with this major, go to <http://www.coloradomesa.edu/career/whatmajor.html>.

All CMU baccalaureate graduates are expected to demonstrate proficiency in critical thinking, communication fluency, quantitative fluency, and specialized knowledge/applied learning. In addition to these campus-wide student learning outcomes, graduates of this major will be able to:

1. Utilize the scientific approach to address novel questions and problems through the development of hypotheses, design of experiments, collection of data, analysis of data, and interpretation of results. (Quantitative Fluency/Applied Learning)
2. Identify, examine, evaluate and discuss the scientific literature. (Critical Thinking)
3. Articulate biological principles and ideas effectively, both in written and oral form. (Communication Fluency)
4. Instruct students based on self-written learning plans to address individual learning and developmental patterns in the Biological Sciences. (Specialized Knowledge)
5. Design a safe and supportive learning environment for secondary education students. (Applied Learning)
6. Apply Biology content knowledge while working with learners to access information in real world settings assuring learner mastery of Biological Sciences. (Specialized Knowledge)
7. Integrate assessment, planning, and instructional strategies in coordinated and engaging ways through multiple means of communication. (Critical Thinking/Communication Fluency)
8. Engage in meaningful and intensive professional learning and self-renewal by regularly examining practice through ongoing study, self-reflection, and collaboration. (Specialized Knowledge)

Advising Process and DegreeWorks

This document is intended for informational purposes to help determine what courses and associated requirements are needed to earn a degree. The suggested course sequencing outlines how students could finish degree requirements. Some courses are critical to complete in specific semesters, while others may be moved around. Meeting with an academic advisor is essential in planning courses and altering the suggested course sequencing. It is ultimately the student's responsibility to understand and fulfill the requirements for her/his intended degree(s).

DegreeWorks is an online degree audit tool available in MAVzone. It is the official record used by the Registrar's Office to evaluate progress towards a degree and determine eligibility for graduation. Students are responsible for reviewing their DegreeWorks audit on a regular basis and should discuss questions or concerns with their advisor or academic department head. Discrepancies in requirements should be reported to the Registrar's Office.

Graduation Process

Students must complete the following in the first two months of the semester prior to completing their degree requirements:

- Review their DegreeWorks audit and create a plan that outlines how unmet requirements will be met in the final semester.
- Meet with their advisor and modify their plan as needed. The advisor must approve the final plan.
- Submit the "Intent to Graduate" form to the Registrar's Office to officially declare the intended graduation date and commencement ceremony plans.
- Register for all needed courses and complete all requirements for each degree sought.

Submission deadlines and commencement details can be found at <http://www.coloradomesa.edu/registrar/graduation.html>.

If a student's petition for graduation is denied, it will be her/his responsibility to consult the Registrar's Office regarding next steps.

INSTITUTIONAL DEGREE REQUIREMENTS

The following institutional degree requirements apply to all CMU baccalaureate degrees. Specific programs may have different requirements that must be met in addition to institutional requirements.

- 120 semester hours minimum.
- Students must complete a minimum of 30 of the last 60 hours of credit at CMU, with at least 15 semester hours in major discipline courses numbered 300 or higher.
- 40 upper-division credits (an alternative credit limit applies to the Bachelor of Applied Science degree).
- 2.00 cumulative GPA or higher in all CMU coursework.
- A course may only be used to fulfill one requirement for each degree/certificate.
- No more than six semester hours of independent study courses can be used toward the degree.
- Non-traditional credit, such as advanced placement, credit by examination, credit for prior learning, cooperative education and internships, cannot exceed 30 semester credit hours for a baccalaureate degree; A maximum of 15 of the 30 credits may be for cooperative education, internships, and practica.
- Pre-collegiate courses (usually numbered below 100) cannot be used for graduation.
- Capstone exit assessment/projects (e.g., Major Field Achievement Test) requirements are identified under Program-Specific Degree Requirements.
- The Catalog Year determines which program sheet and degree requirements a student must fulfill in order to graduate.

Visit with your advisor or academic department to determine which catalog year and program requirements you should follow.

- See "Requirements for Undergraduate Degrees and Certificates" in the catalog for a complete list of graduation requirements.

PROGRAM-SPECIFIC DEGREE REQUIREMENTS

- 2.80 cumulative GPA or higher in all CMU coursework.
- 2.80 cumulative GPA or higher in coursework toward the major content area.
- All EDUC prefix courses must be completed with a grade of B or better.
- All other coursework toward the degree must be successfully completed prior to the internship.
- A grade of C or better must be earned in all required courses, unless otherwise stated.

ESSENTIAL LEARNING REQUIREMENTS (31 semester hours)

See the current catalog for a list of courses that fulfill the requirements below. If a course is an Essential Learning option and a requirement for your major, you must use it to fulfill the major requirement and make a different selection for the Essential Learning requirement.

English (6 semester hours, must receive a grade of "B" or better and must be completed by the time the student has 60 semester hours.)

- ENGL 111 - English Composition (3)
- ENGL 112 - English Composition (3)

Mathematics (3 semester hours, must receive a grade of "C" or better, must be completed by the time the student has 60 semester hours.)

- MATH 113 - College Algebra (4) or higher

3 credits apply to the Essential Learning requirements and one credit applies to the required related study area.

Humanities (3 semester hours)

- Select one Humanities course (3)

Social and Behavioral Sciences (6 semester hours)

- PSYC 233 - Human Growth and Development (3) (must receive a grade of "B" or better)
- Select one Social and Behavioral Sciences course (3)

Natural Sciences (7 semester hours, one course must include a lab, must be completed with a grade of "C" or better.)

- One of the following courses:

ENVS 101 - Introduction to Environmental Science (3) GEOL 103

- Weather and Climate (3)

GEOL 104 - Oceanography (3) GEOL 105 -

Geology of Colorado (3)

PHYS 101 - Elementary Astronomy (3)

- BIOL 105 - Attributes of Living Systems (3)

- BIOL 105L - Attributes of Living Systems Laboratory (1)

History (3 semester hours)

- Select one History course (3)

Fine Arts (3 semester hours)

- Select one Fine Arts course (3)

OTHER LOWER-DIVISION REQUIREMENTS

Wellness Requirement (2 semester hours)

- KINE 100 - Health and Wellness (1)
- Select one Activity course (1)

Essential Learning Capstone (4 semester hours)

Essential Learning Capstone must be taken after completion of the Essential Learning English and Mathematics requirements, and when a student has earned between 45 and 75 hours.

- ESSL 290 - Maverick Milestone (3)
- ESSL 200 - Essential Speech (1)

FOUNDATION COURSES (13 semester hours, must pass all courses with a grade of "C" or higher.)

- CHEM 121 - Principles of Chemistry (4)*
- CHEM 121L - Principles of Chemistry Laboratory (1)*
- CHEM 122 - Principles of Organic Chemistry (4)*
- CHEM 122L - Principles of Organic Chemistry Laboratory (1)*
- STAT 200 - Probability and Statistics (3)

* A higher-level subject may be taken in the same category with advisor approval.

BS, BIOLOGICAL SCIENCES, BIOLOGY SECONDARY EDUCATION REQUIREMENTS (40 semester hours, must pass all courses with a grade of "C" or higher)

Required Core Courses (13 semester hours)

- BIOL 106 - Principles of Animal Biology (3)
- BIOL 106L - Principles of Animal Biology Laboratory (1)
- BIOL 107 - Principles of Plant Biology (3)
- BIOL 107L - Principles of Plant Biology Laboratory (1)
- BIOL 385 - Nature and Philosophy of Science (3)
- BIOL 483 - Senior Thesis (2)

Required Related Study Area (19 semester hours)

- MATH 113 - College Algebra (1)
- One of the following sets of courses:
 - GEOL 111 - Principles of Physical Geology (3) with GEOL 111L - Principles of Physical Geology Laboratory (1)
 - GEOL 113 - Field-Based Intro to Physical Geology (3) with GEOL 113L - Field-Based Intro to Physical Geology Laboratory (1)
 - GEOL 112 - Principles of Historical Geology (3)
 - GEOL 112L - Principles of Historical Geology Laboratory (1)
 - PHYS 111 - General Physics (4)
 - PHYS 111L - General Physics Laboratory (1)
 - PHYS 112 - General Physics II (4)
 - PHYS 112L - General Physics II Laboratory (1)

Biology Electives (8 semester hours)

Select 8 semester hours of upper division BIOL courses:

- _____
- _____
- _____
- _____

GENERAL ELECTIVES (All college level courses appearing on your final transcript, not listed above that will bring your total semester hours to 120 hours. 1 semester hour)

- _____

SECONDARY EDUCATION REQUIREMENTS (29 semester hours, must pass all EDUC courses with a grade of "B" or higher.)

Program Requirements: ENGL 111, ENGL 112, PSYC 233, EDUC 115, and EDUC 215 (all with a grade of B or better) and formal acceptance to the Teacher Education Program.

- EDUC 115 - What It Means to be an Educator (1) (8 field experience hours)
- EDUC 215 - Teaching as a Profession (1) (12 field experience hours)
- EDUC 342 - Pedagogy and Assessment: Secondary and K-12 (3) (20 field experience hours)
- EDUC 343 - Teaching to Diversity (3) (20 field experience hours)
- EDUC 442 - Integrating Literacy across the Curriculum: Secondary and K-12 Art (3) (60 field experience hours)
- EDUC 475 - Classroom Management (1)
- EDUC 497 - Content Methodology Practicum (3) (80 field experience hours)
- EDUC 497D - Methods of Teaching Secondary Science (2)

This course is only offered in the fall semester. It may be taken with either the 300-level or 400-level EDUC courses but must be taken before the student teaching semester.

- EDUC 499G - Teaching Internship and Colloquia: Secondary (12) (600 field experience hours)

SUGGESTED COURSE SEQUENCING

Freshman Year, Fall Semester: 16 credits

- BIOL 105 - Attributes of Living Systems (3) and BIOL 105L - Attributes of Living Systems Laboratory (1)
- ENGL 111 - English Composition (3)
- CHEM 121 - Principles of Chemistry (4) and CHEM 121L - Principles of Chemistry Laboratory (1)
- MATH 113 - College Algebra (4)

Freshman Year, Spring Semester: 16 credits

- BIOL 106 - Principles of Animal Biology (3) and BIOL 106L - Principles of Animal Biology Laboratory (1)
- ENGL 112 - English Composition (3)
- CHEM 122 - Principles of Organic Chemistry (4) and CHEM 122L - Principles of Organic Chemistry Laboratory (1)
- STAT 200 - Probability and Statistics (3)
- EDUC 115 - What It Means to be an Educator (1)

Sophomore Year, Fall Semester: 16 credits

- BIOL 107 - Principles of Plant Biology (3) and BIOL 107L - Principles of Plant Biology Laboratory (1)
- PHYS 111 - General Physics (4) and PHYS 111L - General Physics Laboratory (1)
- PSYC 233 - Human Growth and Development (3)
- ESSL 290 - Maverick Milestone (3)
- ESSL 200 - Essential Speech (1)

Sophomore Year, Spring Semester: 15 credits

- GEOL 111/111L - Principles of Physical Geology (4) or GEOL 113/113L - Field-Based Introduction to Physical Geology (4)
- PHYS 112 - General Physics II (4) and PHYS 112L - General Physics II Laboratory (1)
- ENVS 101 or GEOL 103 or GEOL 104 or GEOL 105 or PHYS 101 (3)
- EDUC 215 - Teaching as a Profession (1)
- KINA Activity (1)
- KINE 100 - Health and Wellness (1)

Junior Year, Fall Semester: 14 credits

- Essential Learning - Social and Behavioral Sciences (3)
- GEOL 112 - Principles of Historical Geology (3) and GEOL 112L - Principles of Historical Geology Laboratory (1)
- Upper Division Biology Elective (4)
- Essential Learning - Humanities (3)

Junior Year, Spring Semester: 16 credits

- EDUC 342 - Pedagogy and Assessment: Secondary and K-12 (3)
- EDUC 343 - Teaching to Diversity (3)
- BIOL 385 - Nature and Philosophy of Science (3)
- Upper Division Biology Elective (4)
- Essential Learning - History (3)

Senior Year, Fall Semester: 15 credits

- BIOL 483 - Senior Thesis (2)
- General Elective (1)
- Essential Learning - Fine Arts (3)
- EDUC 442 - Integrating Literacy Across the Curriculum (3)
- EDUC 475 - Classroom Management (1)
- EDUC 497 - Content Methodology Practicum (3)
- EDUC 497D - Methods of Teaching Secondary Science (2)

Senior Year, Spring Semester: 12 credits

- EDUC 499G - Teaching Internship and Colloquia (12)
-

About This Major . . .

The Associate of Science (A.S.) degree is designed for students who intend to continue their education and obtain a baccalaureate degree. The A.S. is the appropriate choice for students who will take upper division coursework in mathematics, biological sciences, and physical sciences. The Essential Learning requirements of this degree program meet the Colorado Statewide General Education Core and the lower division general education requirements at most public institutions in Colorado.

In the Biology Program students choose courses from four areas: cell, molecular, and developmental biology; anatomical and physiological biology; organismal biology; or ecology, evolution, and systematics. Graduates of our program with an A.S. degree may then seek to continue their education to pursue careers in teaching, plant pathology, wildlife biology, cell biology or biotechnology, among just a few of the career options, or may use their A.S. to support careers in other disciplines.

For more information on what you can do with this major, go to <http://www.coloradomesa.edu/career/whatmajor.html>.

All CMU associate graduates are expected to demonstrate proficiency in critical thinking, communication fluency, quantitative fluency, and specialized knowledge/applied learning. In addition to these campus-wide student learning outcomes, graduates of this major will be able to:

1. Demonstrate a basic knowledge of the main areas of biology (including plant and animal biology, evolution, ecology, cell biology and genetics) and the ability to apply this knowledge to address new questions. (Specialized Knowledge)
2. Gather, organize and analyze scientific data and draw logical conclusions. (Critical Thinking)
3. Demonstrate effective communication skills, both in writing and orally in Biology. (Communication Fluency)

Advising Process and DegreeWorks

This document is intended for informational purposes to help determine what courses and associated requirements are needed to earn a degree. The suggested course sequencing outlines how students could finish degree requirements. Some courses are critical to complete in specific semesters, while others may be moved around. Meeting with an academic advisor is essential in planning courses and altering the suggested course sequencing. It is ultimately the student's responsibility to understand and fulfill the requirements for her/his intended degree(s).

DegreeWorks is an online degree audit tool available in MAVzone. It is the official record used by the Registrar's Office to evaluate progress towards a degree and determine eligibility for graduation. Students are responsible for reviewing their DegreeWorks audit on a regular basis and should discuss questions or concerns with their advisor or academic department head. Discrepancies in requirements should be reported to the Registrar's Office.

Graduation Process

Students must complete the following in the first two months of the semester prior to completing all requirements:

- Review their DegreeWorks audit and create a plan that outlines how unmet requirements will be met in the final semester.
- Meet with their advisor and modify the plan as needed. The advisor must approve the final plan.
- Submit the "Intent to Graduate" form to the Registrar's Office to officially declare the intended graduation date and commencement ceremony plans.
- Register for all needed courses and complete all requirements for each degree sought.

Submission deadlines and commencement details can be found at <http://www.coloradomesa.edu/registrar/graduation.html>.

INSTITUTIONAL DEGREE REQUIREMENTS

The following institutional degree requirements apply to all CMU Associate of Science (AS) degrees. Specific programs may have different requirements that must be met in addition to institutional requirements.

- 60 semester hours total.
- Students must complete a minimum of 15 of the final 30 semester hours of credit at CMU.
- 2.00 cumulative GPA or higher in all CMU coursework.
- A grade of "C" or higher must be earned in all Essential Learning courses in order to be accepted for transfer under the Colorado Core Transfer Consortium General Education curriculum or gtPathways, Colorado's guaranteed transfer program.
- A course may only be used to fulfill one requirement for each degree/certificate.
- No more than six semester hours of independent study courses can be used toward the degree.
- Non-traditional credit, such as advanced placement, credit by examination, credit for prior learning, cooperative education and internships, cannot exceed 15 semester credit hours for an associate of science degree; A maximum of 6 of the 15 credits may be for cooperative education, internships, and practica.

- Pre-collegiate courses (usually numbered below 100) cannot be used for graduation.
- Capstone exit assessment/projects (e.g., Major Field Achievement Test) requirements are identified under Program-Specific Degree Requirements.
- The Catalog Year determines which program sheet and degree requirements a student must fulfill in order to graduate. Visit with your advisor or academic department to determine which catalog year and program requirements you should follow.
- See "Requirements for Undergraduate Degrees and Certificates" in the catalog for a complete list of graduation requirements.

PROGRAM-SPECIFIC DEGREE REQUIREMENTS

- A grade of "C" or higher must be earned toward the major content area.

ESSENTIAL LEARNING REQUIREMENTS (31 semester hours)

See the current catalog for a list of courses that fulfill the requirements below. If a course is an Essential Learning option and a requirement for your major, you must use it to fulfill the major requirement and make a different selection for the Essential Learning requirement.

English (6 semester hours, must receive a grade of "C" or better and must be completed by the time the student has 60 semester hours.)

- ENGL 111 - English Composition (3)
- ENGL 112 - English Composition (3)

Mathematics (3 semester hours, must receive a grade of "C" or better, must be completed by the time the student has 60 semester hours.)

- MATH 113 - College Algebra (4) or higher

3 credits apply to the Essential Learning requirements and 1 credit applies to elective credit.

Humanities (3 semester hours)

- Select one Humanities course (3)

Social and Behavioral Sciences (6 semester hours)

- Select one Social and Behavioral Sciences course (3)
- Select one Social and Behavioral Sciences course (3)

Natural Sciences (7 semester hours, one course must include a lab) CHEM 131/131L and CHEM 132/132L recommended.

- Select one Natural Sciences course (3)
- Select one Natural Sciences course with a lab (4)

History (3 semester hours)

- Select one History course (3)

Fine Arts (3 semester hours)

- Select one Fine Arts course (3)

OTHER LOWER-DIVISION REQUIREMENTS

Wellness Requirement (2 semester hours)

- KINE 100 - Health and Wellness (1)
- Select one Activity course (1)

ASSOCIATE OF SCIENCE: BIOLOGY REQUIREMENTS (24 semester hours, a grade of "C" or better must be earned in all courses.)

Core Classes (16 Semester Hours)

- BIOL 105 - Attributes of Living Systems (3)
- BIOL 105L - Attributes of Living Systems Laboratory (1)
- BIOL 106 - Principles of Animal Biology (3)
- BIOL 106L - Principles of Animal Biology Laboratory (1)
- BIOL 107 - Principles of Plant Biology (3)
- BIOL 107L - Principles of Plant Biology Laboratory (1)
- BIOL 208 - Fundamentals of Ecology & Evolution (3)
- BIOL 208L - Fundamentals of Ecology & Evolution Laboratory (1)

Required Biology Specialization Courses (8 Semester Hours) To be selected in consultation with student's advisor.

- _____
- _____
- _____
- _____
- _____
- _____

GENERAL ELECTIVES (All college level courses, not listed above, that will bring your total semester hours to 60 hours. Up to 3 hours may be needed.)

- MATH 113 - College Algebra (1)
- _____
- _____
- _____
- _____
- _____
- _____

SUGGESTED COURSE SEQUENCING

Freshman Year, Fall Semester: 15 credits

- BIOL 105 - Attributes of Living Systems (3)
- BIOL 105L - Attributes of Living Systems Laboratory (1)
- ENGL 111 - English Composition (3)
- MATH 113 - College Algebra (4)
- Essential Learning - Fine Arts (3)
- KINE 100 - Health and Wellness (1)

Freshman Year, Spring Semester: 16 credits

- BIOL 106 - Principles of Animal Biology (3)
- BIOL 106L - Principles of Animal Biology Laboratory (1)
- ENGL 112 - English Composition (3)
- Essential Learning - Humanities (3)
- Essential Learning - Social and Behavioral Sciences (3)
- Essential Learning - History (3)

Sophomore Year, Fall Semester: 15 credits

- BIOL 107 - Principles of Plant Biology (3)
- BIOL 107L - Principles of Plant Biology Laboratory (1)
- BIOL 208 - Fundamentals of Ecology & Evolution (3)
- BIOL 208L - Fundamentals of Ecology & Evolution Laboratory (1)
- Biology Specialization Selection (4)
- Essential Learning - Natural Science without lab (3)

Sophomore Year, Spring Semester: 14 credits*

- Biology Specialization Selection (3)
- Essential Learning - Natural Science with lab (4)
- Essential Learning - Social and Behavioral Sciences (3)
- Wellness Requirement - Activities Course (1)
- General Elective (3)

*Students that intend to continue with Colorado Mesa University should take ESSL 290 - Maverick Milestone and ESSL 200 - Essential Speech during the final semester of their Associate of Science work.



2018-2019 PROGRAM REQUIREMENTS
Minor: Biology

About This Minor. . .

In the Biology Program students choose courses from four areas: cell, developmental, and molecular biology; anatomical and physiological biology; organismal biology; and ecology, evolution, and systematics. Graduates of our program with a Minor in Biology may then seek to continue their education in Biology or may use their Minor to support careers in other disciplines.

Advising Process and DegreeWorks

This document is intended for informational purposes to help determine what courses and associated requirements are needed to earn a minor. Meeting with an academic advisor is essential in planning courses and developing a suggested course sequencing. It is ultimately the student's responsibility to understand and fulfil the requirements for her/his intended minor.

DegreeWorks is an online degree audit tool available in MAVzone. It is the official record used by the Registrar's Office to evaluate progress towards a minor. Students are responsible for reviewing their DegreeWorks audit on a regular basis and should discuss questions or concerns with their advisor or academic department head for the minor. Discrepancies in requirements should be reported to the Registrar's Office.

Graduation Process

A minor cannot be awarded by itself. It must be combined with a baccalaureate degree outside the major field of study. Students should follow the graduation process outlined for the baccalaureate degree and list their majors and minors on the "Intent to Graduate" form.

If a student's petition for graduation is denied, it will be her/his responsibility to consult the Registrar's Office regarding next steps.

INSTITUTIONAL MINOR REQUIREMENTS

The following institutional requirements apply to all CMU minors. Specific programs may have different requirements that must be met in addition to institutional requirements.

A minor consists of 15-24 semester hours. There may be prerequisites required for the minor which will increase the total number of credit hours for a student who has not already taken those prerequisites.

Courses taken to satisfy Essential Learning, major requirements, or electives can be counted toward the minor if applicable.

At least 33 percent of the credit hours required for the minor must be in courses numbered 300 or above.

At least 25 percent of the classes must be taken at CMU.

2.00 cumulative GPA or higher for the courses used for the minor.

A minor is not a degree by itself and must be earned at the same time as a baccalaureate degree.

A minor must be outside the major field of study.

A student may earn up to five minors with any baccalaureate degree at CMU.

The Catalog Year determines which program sheet and degree requirements a student must fulfill in order to graduate. Visit with your advisor or academic department to determine which catalog year and program requirements sheet you should follow.

See "Requirements for Undergraduate Degrees and Certificates" in the catalog for a complete list of graduation requirements.

PROGRAM-SPECIFIC MINOR REQUIREMENTS

20 semester hours for the Minor in Biology.

REQUIRED COURSES FOR THE BIOLOGY MINOR (20 semester hours)

BIOL 105 - Attributes of Living Systems (3)

BIOL 105L - Attributes of Living Systems Lab (1)

BIOL 106 - Principles of Animal Biology (3)

BIOL 106L - Principles of Animal Biology Lab (1)

BIOL 107 - Principles of Plant Biology (3)

BIOL 107L - Principles of Plant Biology Lab (1)

Choose 8 Semester Hours of BIOL courses, all of which must be upper division hours:

? _____
?
?
?



2018-2019 PROGRAM REQUIREMENTS
Minor: Forensic Science

About This Minor. . .

Forensic science is a growing professional field throughout the United States. Forensic science is the interface between analytical science and the law. Students with a minor in Forensic science can seek employment with CBI and other employers conducting forensic investigations, or they may continue their education by seeking a Master's degree in Forensic science at another institution. The minor is best suited for students majoring in Biology or Chemistry. The minor will enhance students' skills in the molecular biology, analytical chemistry, and criminalistic techniques used in forensic investigations.

Advising Process and DegreeWorks

This document is intended for informational purposes to help determine what courses and associated requirements are needed to earn a minor. Meeting with an academic advisor is essential in planning courses and developing a suggested course sequencing. It is ultimately the student's responsibility to understand and fulfil the requirements for her/his intended minor.

DegreeWorks is an online degree audit tool available in MAVzone. It is the official record used by the Registrar's Office to evaluate progress towards a minor. Students are responsible for reviewing their DegreeWorks audit on a regular basis and should discuss questions or concerns with their advisor or academic department head for the minor. Discrepancies in requirements should be reported to the Registrar's Office.

Graduation Process

A minor cannot be awarded by itself. It must be combined with a baccalaureate degree outside the major field of study. Students should follow the graduation process outlined for the baccalaureate degree and list their majors and minors on the "Intent to Graduate" form.

If a student's petition for graduation is denied, it will be her/his responsibility to consult the Registrar's Office regarding next steps.

INSTITUTIONAL MINOR REQUIREMENTS

The following institutional requirements apply to all CMU minors. Specific programs may have different requirements that must be met in addition to institutional requirements.

- A minor consists of 15-24 semester hours. There may be prerequisites required for the minor which will increase the total number of credit hours for a student who has not already taken those prerequisites.
- Courses taken to satisfy Essential Learning, major requirements, or electives can be counted toward the minor if applicable.
- At least 33 percent of the credit hours required for the minor must be in courses numbered 300 or above.
- At least 25 percent of the classes must be taken at CMU.
- 2.00 cumulative GPA or higher for the courses used for the minor.
- A minor is not a degree by itself and must be earned at the same time as a baccalaureate degree.
- A minor must be outside the major field of study.
- A student may earn up to five minors with any baccalaureate degree at CMU.
- The Catalog Year determines which program sheet and degree requirements a student must fulfill in order to graduate. Visit with your advisor or academic department to determine which catalog year and program requirements sheet you should follow.
- See "Requirements for Undergraduate Degrees and Certificates" in the catalog for a complete list of graduation requirements.

PROGRAM-SPECIFIC MINOR REQUIREMENTS

- 24-26 semester hours for the Minor in Forensic Science.

REQUIRED COURSES FOR THE FORENSIC SCIENCE MINOR (24-26 semester hours)

- BIOL 301 - Genetics (3)
- BIOL 301L - Genetics Laboratory (1)
- CHEM 301 – Analytical Chemistry (3)
- CHEM 301L – Analytical Chemistry Laboratory (1)
- CHEM 315 – Biochemistry (3)
- CHEM 315L – Biochemistry Laboratory (1)
- FOAN 232 – Survey of Forensic Science (2)
- FOAN 232L – Survey of Forensic Science Laboratory (1)
- FOAN 480 – Professional Issues in Forensic Science (3)

Complete 2 of the following options (6-8 semester hours).

BIOL 209 – Anatomy & Physiology I (3) and BIOL 209L - Anatomy & Physiology I Laboratory (1)

BIOL 217 – Forensic Entomology (2) and BIOL 217L - Forensic Entomology Laboratory (1)

BIOL 344 – Forensic Molecular Biology (3) and BIOL 344L – Forensic Molecular Biology Laboratory (1)

BIOL 410 – Human Osteology (3) and BIOL 410L – Human Osteology Laboratory (1)

BIOL 442 – Pharmacology (3)

CHEM 431 – Instrumental Analysis (3) and CHEM 431L - Instrumental Analysis Laboratory (1)

FOAN 280 – Crime Scene Processing (3) and FOAN 280L – Crime Scene Processing Laboratory (1)

Lecture and lab must be taken together for credit towards graduation.

Program Reviewer's Report

Academic Program Review
Colorado Mesa University Biology Program (2014-2019)

External review prepared by:

Helen Caprioglio, Ph.D.

Professor of Biology and Executive Director for Assessment & Institutional Effectiveness

Colorado State University Pueblo

Site visit conducted March 6th, 2020

Program Overview

The CMU Biology curriculum provides a robust education in the biological sciences, with appropriate emphasis areas to serve multiple student interests and career plans. The program serves over 550 BS and over 50 AS biology majors with diverse interests as well as providing a significant service role for several other programs at CMU. During the review period there has been a steady enrollment of majors and number of degrees awarded, with an increase in total student credit hours from 15,890 to 17,138, predominately within service courses. During the review period, the faculty FTE was reported to have increased by 2.5 FTE to serve the increase student demand. This time period included significant faculty turnover due to several faculty resignations which were replaced with new faculty, resulting in a shift to a lesser percentage of tenured faculty and more tenure-track assistant professors. Currently, the department consists of 16 tenured or tenure-track faculty, 7 full-time faculty and 7 part-time lecturers, along with two full-time lab coordinators. Faculty were very engaged in the department and appeared very dedicated, collegial, and focused on student success. Students commented very positively on the educational experience and faculty.

Curriculum

The Biology curriculum is well designed, current and appropriate to provide excellent learning opportunities for students. There is a good breadth of subjects for a diverse interests and evidence of productive interactions between the subdisciplines of Biology. An inclusive process for department faculty involvement in curriculum discussion and decisions was referenced. The significant reorganization of curriculum which was implemented to provide appropriate emphases to serve all students, and a two-year planning schedule is commendable. The structure has been successful as the Cellular, Molecular and Developmental Biology (CMDDB) emphasis increased to 162 majors in 2018-19.

Biology faculty also participate in the Maverick Milestone capstone general education course to provide a science disciplinary contribution. Faculty who had been involved in this course indicated it was rewarding although quite demanding. Other notable curriculum endeavors include the evolving connections for high school student education through the Concurrent Enrollment and Early Scholars programs. Also reviewed were some online course structures in D2L, which demonstrate the departmental implementation of remote instruction to serve additional student populations. With the recent shifts due to coronavirus, the remote learning efforts are now campus wide. Concerns with secondary education program accreditation changes and

performance challenges have been addressed with curriculum updating as well, to better prepare science educators.

Student Demand and Success

The student credit hour numbers are evidence of the student demand for the biology major and service courses. Class sizes typically reach capacity in multiple sections. Increasing numbers of upperclassmen during the review period suggest that retention has increased, leading to more demand for course seats. Further increases in freshman cohort sizes such as that seen in fall 2019, along with significant retention, will lead to increased demand for faculty, scheduling, and facility resources.

Graduates of the program have been successful in many fields as detailed in the self-study. Discussion with students during the site visit evidenced that they truly engage in the program, work with faculty and appreciate the excellence of program. Many spoke excitedly about what they had accomplished, work they were doing currently or opportunities they have as they graduate. D2L and early alert are available for intervention and supporting student success, including 7-week grade checks and both faculty and student service mentors. Faculty are looking at improving the advising structure to better support student success.

Program Resources

The department has a dedicated faculty using good practice for teaching and engaging students in research. Morale seemed high and examples of teamwork were evident. Projects and efforts within the department appear to play to the individual strengths of the faculty and achieve common goals. Many faculty members are active in conducting research, completing publications, and in seeking and obtaining external support as time permits. This is in line with the Teacher-Scholar model the institution has adopted. Professional development is provided twice yearly to build skills and Teacher to Teacher events are also available. Some faculty expressed a perception that the tenure bar is uncertain. However, this reviewer saw evidence that the biology faculty are quite productive and dedicated, an observation not disputed during discussions with campus administrators.

Biology faculty teaching loads are high, a fairly common practice at regional comprehensives. This fact, along with a high level of student advising duties leads to trade-offs in the time available for service and/or scholarship. Scholarly activities were mentioned from the previous review as having minimal institutional support in the last review. This has been addressed through direct faculty efforts toward external collaborations. Some faculty expressed hesitance in applying for "big grants" since facilitating this may be difficult. Some support mechanism for grant writing might be considered if increased grants are an objective of the institution. Creative faculty projects have identified smaller local collaborations which have provided excellent funding for some research and additional student opportunities. This is to be commended as it enhances the program.

The "Lab load" calculation for course credit assignments which is in place is beneficial to course quality, since many faculty members must set up their own specialized lab materials prior to class. Prep room issues were evident as numerous class prep carts in the prep room were restricting clear access to lab work benches. A lab coordinator and assistant are responsible for prepping lab course materials and ordering of supplies. The

efficiency of this process was improved with the hiring of the assistant but still appears to be a point of challenge, at least with regards to facilities for the number of lab sections being offered.

The department faculty currently consists of 16 tenured or tenure-track faculty, 7 full-time faculty and 7 part-time lecturers. The reported ratio of student to faculty FTE has increased from 22.5 to 25.2 during the review period with changes in student credit hours and faculty FTE. The method of calculating faculty FTE for this is by credit hours offered divided by 24 credits, not by number of faculty employed, so an overall increase in faculty teaching capacity is less obvious. Lab loads and other reassigned time were not obvious. Faculty turnover in recent years likely caused some disruption in the department, including the time demands for multiple searches. The filling of those positions was reported as a 2.5 FTE increase in faculty realized to support increased enrollments. While the turnovers led to fewer fully-tenured faculty, the additional tenure-track lines have allowed for an increased percentage of SCH (63%) to be taught by T/TT faculty in 2018-19 and as these newer faculty establish research programs it is hoped more research opportunities for students will be available. In addition, the faculty provide advising for three student clubs to further student engagement related to disciplinary topics or career paths.

The current faculty complement seems to be adequately covering the existing course load, with some course emphasis areas more challenged than others. Some faculty expressed concern in maintaining the current workloads. It appears little additional capacity remains at this point, so the pattern will not be sustainable should further increases in student numbers be realized.

The increased student demand during recent years was met by hiring new faculty, adjusting class section sizes and strategic scheduling of classrooms and laboratories. Room use appears to have been maximized. However, in some cases the laboratory maximum capacity by design (24) is being surpassed to provide additional seats for student demand. This may need to be re-examined for concerns related to safety and student access to limited instrumentation, especially in cellular and molecular labs within the popular CMDDB emphasis.

Facilities appeared well-kept and functional. Some labs were indicated as needing updates and the department may need additional teaching labs in the future as some rooms run sections back to back most of the week at this point.

Instructional Technology indicated it has been able to respond to any biology-specific technology requests for software, etc. The library has excellent support personnel and services available to students and faculty, including materials and course reserve. Both support areas seemed very engaged in support of the Biology program and campus overall.

Funding for lab classes and operations seemed to be adequate as glaring needs were not observed or mentioned, but improvements or upgrades are always welcome for teaching/research instrumentation or supplies. Faculty showed pride in the available instrumentation, some of which was obtained through donation. Good collaboration with external entities was referenced on multiple occasions. Excellent programs for student learning were also in evidence. This included the BioSinQ program to link with alumni to provide mentored experience and networking, as well as the Saccomanno summer research internships with stipends to support student experiential learning. Collaboration with the Body Farm provides another unique experiential learning opportunity for biology and forensics students. It appeared and was confirmed by faculty that those students who seek research experience are provided beneficial opportunities.

A horizontal administrative structure has department chairs reporting directly to VPAA. In discussions with the VPAA and AVPAA, they seemed well-informed on the biology program and recognized strengths and efforts in the program as well as acknowledging some current challenges. There was some faculty mention of perceived challenges in this structure for acknowledgement of departmental concerns and needs.

SLOs and Assessment

The Biology program has a robust assessment plan for their learning outcomes. There appears to be significant faculty ownership and engagement in the assessment process. The self-study evidenced obvious progress from departmental assessment efforts. Course artifacts used for review provide useful information from pretest/posttest scores, appropriate measures of scientific approach, critical thinking and communication fluency outcomes. The results informed planning for curriculum improvements as well as adjustments to assessment, thereby “closing the loop.”

For further demonstration of breadth of content knowledge, Biology ETS Major Field Test scores demonstrated consistent student performance in terms of percent answers correct. Overall institutional mean scores were at the national mean over the review period. Among the four subscores, molecular biology and genetics seemed consistently strong especially in more recent cohort testing. Assessment indicators showing sustained strength over multiple years (above national 50th percentile) included molecular biology and molecular genetics, diversity of organisms, and population genetics and evolution.

Future plans

The department plans include continual improvement to the curriculum and advising. Continuing their successful efforts in providing student research opportunities and community connections is vital.

The faculty have considered the possibility of starting a master’s program but, without additional resources, this would be challenging. The reviewer’s home institution has offered an MS program for many years, maintained through faculty efforts. As the level of institutional support has fluctuated over time, adequate funding has been found to be crucial to the observed level of success with particular cohorts. An ongoing concern is any collateral effect on the undergraduate program. Benefits have included increased research activity with the graduate students and graduate teaching assistants teaching lower division laboratories; however, resources are a constant challenge and all but a few courses are stacked 400/500 level rather than dedicated graduate courses. This contributes to increased faculty time demands facilitating dual-level courses.

Balancing the need to provide research opportunities for student and faculty success with the limited resources and cost of adjusted faculty course load is always challenging. The reviewer’s home institution recently implemented a lab cohort structure, funded by a Department of Education grant which has a group of undergraduate students working on aspects of a single project with a faculty member. Advanced students help peer-mentor incoming students to allow for more exposure to research opportunities. The collaboration is helpful for all and retention and cohort degree completion is high, which may have much to do with the funding students receive to allow them to focus on studies. A similar model might be adaptable to CMU Biology, but would require a funding source.

Strengths and Challenges

The outstanding strength of the Biology program is the faculty and staff. They are caring, dedicated, student-focused, and collegial, as evidenced from both meetings with them and from student comments. Under the direction of the chair, and with knowledge from the previous chair, the faculty and staff build and maintain the program. Sustained and increased student enrollment in the program and its service courses provide evidence that the program is working well. Maintaining an appropriate complement of high-quality faculty will be important as further increases in enrollment are realized.

The facilities and instrumentation are appropriate to the program and appeared to be fully utilized. However, in the rapidly advancing field of biology, updates and improvements to instrumentation and facilities are an ongoing need. Facilities were a continued strength from the previous review and that is to be commended. With continued enrollment growth there will be a need to provide for additional space and resources. One challenge needing prompt attention is the prep room for lab course materials as well as storage of specimens.

Recommendations

Recommendations for attention include the following, with the understanding of limited resource availability.

1. Explore options for optimizing the lab prep facilities and capacity for appropriate storage of supplies and specimens.
2. Evaluate the number of teaching laboratories related to course section demand and strategic scheduling. This would include evaluating for potentially underutilized space, if any exists. Create a plan for providing additional lecture and lab space as needed to serve increases in student enrollment.
3. Identify additional resources to support student research with faculty or community partners. This will benefit both the program and the community.
4. Maintain appropriate faculty FTE through strategic hiring, when possible, to continue providing this quality academic program to students.

Executive Summary Template for External Reviewer's Observations

Program Review Element	Check the appropriate selection				Provide explanation if not agree with element and/or why unable to evaluate
	Agree	Not Agree	Unable to Evaluate	Not Applicable	
The program's self-study is a realistic and accurate appraisal of the program.	√				
The program's mission and its contributions are consistent with the institution's role and mission and its strategic goals.	√				
The program's goals are being met.	√				
The curriculum is appropriate to the breadth, depth, and level of the discipline.	√				
The curriculum is current, follows best practices, and/or adheres to the professional standards of the discipline.	√				
Student demand/enrollment is at an expected level in the context of the institution and program's role and mission.	√				
The program's teaching-learning environment fosters success of the program's students.	√				
Program faculty members are appropriately credentialed.	√				
Program faculty members actively contribute to scholarship, service and advising.	√				
Campus facilities meet the program's needs.	√				
Equipment meets the program's needs.	√				
Instructional technology meets the program's needs.	√				
Current library resources meet the program's needs.	√				
Student learning outcomes are appropriate to the discipline, clearly stated, measurable, and assessed.	√				
Program faculty members are involved in on-going assessment efforts.	√				
Program faculty members analyze student learning outcome data and program effectiveness to foster continuous improvement.	√				
The program's articulation of its strengths and challenges is accurate/ appropriate and integral to its future planning.	√				

