SELF STUDY

PROGRAM REVIEW
BACHELOR OF SCIENCE
IN

Biology

COLLEGE OF ARTS AND SCIENCES
SPRING 2024
DAKOTA STATE UNIVERSITY

ONSITE VISIT DATE: April 5th, 2024

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Part 1 - Institutional History

Dakota State University has enjoyed a long and proud history of leadership and service since its founding in 1881 as the first teacher education institution in the Dakota Territory.

For most of its history, DSU has been identified with teacher preparation, first as a normal school and later as a four-year public college. The University has had several different names, among them Madison Normal, Eastern Normal, and General Beadle State College. The name, Dakota State College, was adopted in 1969. On July 1, 1989, Dakota State College became Dakota State University. The University title was conferred on the institution by the South Dakota Legislature in order to better reflect its purpose in the total scheme of the state's higher education system. Prospective elementary and secondary teachers continue to be educated here. To this traditional emphasis, DSU added business and traditional arts and science programs in the 1960s and two health services programs, Health Information Management and Respiratory Care, in the late 1970s.

In 1984, the South Dakota Legislature and the South Dakota Board of Regents turned to Dakota State University to educate leaders for the information age. In response, Dakota State University developed leading-edge computer/information systems degree programs. The graduates of these programs enjoy enviable status in the national marketplace. As a leader in computer and information systems programs, DSU has pioneered the application of computer technology to traditional fields of academic endeavor. This thrust has led to the development of unique degree programs in biology, digital arts and design, English, and mathematics.

Dakota State University continues to serve the needs of a changing society in its second century. In order to provide its academic programs to a broader audience, DSU has taken a step forward in distance education and offers courses and academic programs online. As society's educational needs change, Dakota State University will continue to evolve to meet these needs with education, scholarship and service.

History of the University

- 1881 - Dakota Normal School established by the Territorial Legislature.
- 1947 - Name changed to General Beadle State Teachers College.
- 1969 - Name changed to Dakota State College.
- 1984 - SD Legislature mandated mission change at Dakota State. The new mission integrated technology across all areas of the curriculum.
- 1989 - Name changed to Dakota State University.
- 2004 - DSU goes wireless with tablet computer initiative. DSU is named Center of Information Assurance by the National Security Agency and the Department of Homeland Security.

- 2017 - DSU Rising Initiative: The initiative is the result of a $30M donation from philanthropists Miles and Lisa Beacom and Denny Sanford. The donation allowed for the construction of a research and development building for the Madison Cyber Labs (MadLabs). The funds also provided for additional scholarships, new program development, and hiring of more faculty and staff. In addition, South Dakota Governor Dennis Daugaard pledged $10M to Dakota State, monies from the research and development Future Fund. U.S. Senator Mike Rounds (R-SD) has pledged to help Dakota State earn $20M in federal funds to advance DSU's cyber mission.

University Mission

The mission of Dakota State University as it appears in the Board of Regents Policy Manual (1:10:5, adopted 08/07) states:

The Legislature established Dakota State University as an institution specializing in programs in computer management, computer information systems, and other related undergraduate and graduate programs as outlined in SDCL § 13-59-2.2. A special emphasis is the preparation of the elementary and secondary teachers with expertise in the use of computer technology and information processing in the teaching and learning process.

The Board implemented SDCL § 13-59-2.2 by authorizing undergraduate and graduate programs that are technology-infused and promote excellence in teaching and learning. These programs support research, scholarly and creative activities and provide service to the State of South Dakota and the region. Dakota State University is a member of the South Dakota System of Higher Education.

Mission Statement
DSU provides learning that integrates technology and innovation to develop graduates ready to contribute to local, national, and global prosperity.

Vision
Building upon its distinctive mission, DSU will become:

- The university of choice for those seeking a student-centered institution that offers innovative programs grounded in teaching, research, technology, scholarship, and service excellence.
- An academic community that serves as an economic engine in local, national, and global markets.
- A campus recognized for its achievements in continuous quality improvement.

Values

- Student success.
- University-wide Excellence.
- Distinction in Teaching, Scholarship, and Service.
- Academic Freedom and Integrity.

- Diversity, Respect, and Inclusion.
- Continuous Improvement.
- Community, Collaboration, and Communication.
- Technology and Innovation inside and outside the classroom.

As the institution endeavors to articulate its mission in the fullest way, our degree programs are scrutinized each year to ensure they remain on the cutting edge relative to technology to enhance and support instruction and address work force demands. When new degree programs are proposed by the colleges, they must clearly satisfy the "Is it compatible with our mission?" question before any additional planning is done. To date, those curriculum development efforts have resulted in 27 bachelor's degrees, 6 associate's degrees, and 24 certificate programs. These programs range from Cyber Security to Elementary Education to Digital Arts and Design to Business Administration. In the delivery of graduate education, the institution also offers seven master's degrees, certificates, and four doctoral degrees.

College of Arts and Sciences Mission

The College of Arts and Sciences offers a variety of programs and courses leading to many successful career paths. Computer technology is integrated throughout all majors. The College offers the vast majority of DSU's required 30-credits of general education courses, serving as the backbone for all degrees. Faculty in speech and theater, English, and digital arts and design are principally located in Beadle Hall. Math, science, and social science faculty are housed in the C. Ruth Habeger Science Center.

The College of Arts and Sciences offers degree programs in Biology, Biology Education, Computer Game Design, Digital Arts and Design, English Education, English for New Media, Mathematics, Mathematics Education, and Cyber Leadership and Intelligence. In addition to these degree programs, the College of Arts and Sciences offers majors, minors, and courses which qualify students to apply for admission to professional schools and programs.

History of the Biology Program

A degree program in Biology for Information Systems was established at the time of the institutional mission change in 1984. This degree fits well with the defined focus of DSU on computer integration into the curriculum and served the needs of specialized health profession programs. Although there have been many changes in the technology available to the program, the basic goals of the program have remained largely unchanged since the inception of the mission change.

Beginning in the 2017-18 academic year, the program name was changed from Biology for Information Systems to Biology. The information systems name was useful at the time of the mission change to distinguish the differences in programs at DSU, but the name was still unfamiliar to most people and often created problems for our majors applying to

graduate programs, professional schools, and other jobs. The biology program still includes strong support for the integration of computer technology in the program as befits the mission of Dakota State University. The ways that computers have been integrated into all courses in the biology curriculum has greatly increased over time.

Starting in Fall 2021, Biology Education and Biology degrees were merged into a single Biology (BS) degree with two different specializations. Students completing the Biology BS can either specialize in Biology Education or Integrative Biology. Most of what follows in this Self Study report will focus on the Integrative Biology Specialization. The College of Education is accredited by the Council for the Accreditation of Educator Preparation (CAEP), and the Biology Education specialization was reviewed as part of this process and received accreditation in 2023.

Date of last biology program review

The date of the last institutional program review was February 2018.

Outcomes of the last biology program review

The reviewer thought the greatest strength of the Biology Program was the enthusiastic, collegial faculty members. They were impressed with how much was accomplished with such limited resources and an overall lack of institutional support. Faculty are on 12-hour teaching loads yet demonstrate research productivity of faculty at universities with both lower teaching loads (9-hour) and greater resources (dedicated research space). Since this review, teaching loads have not decreased, but there is some recent talk of a reduction because after South Dakota Board of Regents reclassifications DSU has been on the same tier with South Dakota School of Mines and Technology where their professors have a 9-hour teaching load. The biology program has had enhanced financial support through South Dakota NSF-EPSCoR funding. DSU was on the Track-1 project which began in Fall 2019 and has used that funding for equipment, consumable supplies, undergraduate student research stipends, and travel. This current SD-EPSCoR project ends in 2025, but we anticipate being included in the next project since the DSU Associate Vice President for Research and SD-EPSCoR representative has been very support of our work. Also, DSU has begun to become embedded in SD's Institutional Development Award (IDeA) Network of Biomedical Research Excellence (INBRE, or what used to be called BRIN). This is a statewide network that pulls in NIH funding to stimulate research on issues relevant to biomedicine, and they're in the process of developing their vision for the next five years.

Numerous times, the reviewer noted that biology faculty were stretched to capacity. A major concern of the reviewer was faculty workload in relation to BIOL 498 (required, undergraduate research credits) where faculty are expected to have one-on-one interactions with all students. At their program, the required research experience was eliminated due to individual attention and expense required for every student in the major was simply not sustainable. We are developing a research culture in the biology department, and these one-on-one interactions are incredibly rewarding for both the

faculty member and the student. BIOL 498 is still a requirement for all biology majors, but we have shown some increased flexibility to allow internships as a substitute for this requirement. The reviewer suggested an additional tenure-track line to hire someone with expertise in molecular biology. Shortly after this review, Dr. Videau left the program and was replaced by Dr. Sathoff, who has extensive training in molecular biology. Dr. Sathoff still teaches the majority of molecular biology related courses, but his workload has recently been reduced due to Dr. Dececchi teaching bioinformatics and Dr. Elbert teaching biochemistry. This change in workforce answers some of the reviewer's concerns about burdening one faculty member with the entire emphasis of a degree program. Though, the biology faculty members are still stretched thin and with any moderate increase in enrollment another faculty line is needed.

The reviewer noted that the amount of money allocated to faculty for travel and training was not sufficient. In 2021, professional development funds moved out of the Provost's Office to the College budget level. Currently, faculty write proposals to obtain funding, so unfortunately, this money is not guaranteed for everyone. Though, faculty can obtain more than $1,000 a year in funding and conference travel is now paid for in full if your proposal is successfully funded.

The curriculum was deemed an appropriate mix and balance of areas of biology. The previous two reviewers (in both 2009 and 2018) suggested that the non-majors survey courses should be redesigned around contemporary issues to better serve the general education goals of the state-wide system. A major hurdle to implementing these suggested changes is lack of biology faculty time to redesign the courses. But, we are slowly making progress. Several new topics based general education courses are offered over the summer (Human Health and Biology, General Botany, Introduction to Biotechnology). During the academic year, Environmental Biology will be offered for the first-time during Fall 2024 and Human Health and Biology will be offered in Spring 2025. If these courses are successful, we plan on offering fewer sections of the broad survey courses.

The small number of biology majors and the relatively low levels of retention were cited as critical concerns. The reviewer suggested increased marketing because the biology program has potential to draw highly motivated students from the region if more prospective students knew of its existence. The biology program still flies under the radar, but recent marketing attempts have been made to highlight unique experiences (particularly undergraduate research opportunities) available to students across several different media platforms. Additionally, in Spring 2024, a DSU Marketing feature on the biology program will be released. Recent changes in the exercise science department have led to more collaboration between our programs. Historically, a significant number of biology majors switched to exercise science. In response, we created a double major with hopes to minimize some of the losses and allow students to explore both disciplines without having to pick one over the other. This unique collaboration between departments will provide students with diverse, hands-on experiences, which should help them in graduate school. The number of biology majors has increased slightly in recent years, but total program enrollment is still a major concern.

Part 2 Trends in the Academic Program

Overarching trends within the discipline are extremely difficult to identify because biology encompasses such an incredible variety of sub-disciplines. Due to this diverse nature of biology, there is not even an accrediting agency for biology programs because they all look somewhat different. Students who possess an interdisciplinary skillset and are well-versed in not only biology but also in chemistry, mathematics, computer science, and physics will be prepared for the dynamic employment marketplace following graduation. The biology program is focused on integrating biology with other STEM disciplines. Mathematics, physical science, and computer science concepts are integrated into our biology courses.

Ways trends have influenced the biology program, as well as ways trends are likely to influence the program in the future.

Academic programs are charged with the task of educating students to be effective and productive in fields which are ever changing. Trends have fluctuated wildly, but a constant is providing students with the best possible background for fields or areas which may not have existed at the beginning of an undergraduate career. Although some universities have chosen to focus undergraduate education on areas related to specific trends, others seek to provide a firm foundation geared toward providing students with a solid foundation designed to enable students to thrive as new discoveries challenge the discipline to change in response to new developments.

The biology program at DSU has chosen to focus on providing students with a strong foundation firmly grounded in core principles and emphasizes the how other STEM disciplines inform the field of biology. In addition, computer technology has been, and continues to be, integrated into the program. Rooted in the mission of DSU, the biology program chooses to continue to integrate computer technology and to train students in a broad manner with aims to facilitate transfer of computer science knowledge to the context of biology.

The way that we deliver our biology courses has changed. Our program has made a real effort to incorporate more active learning pedagogies, which have a myriad of demonstrated benefits over traditional lectures. Opportunities for collaborative learning involving group work are embedded in lectures. This emphasis on collaborative learning helps students become more competitive applications once they graduate from the biology program because employers value the ability to work in groups.

Therefore, biology graduates need strong backgrounds in physics, chemistry, and mathematics as biological research becomes more interdisciplinary. There has been reform in biological education with decreased emphasis on learning large bodies of factual information and more emphasis on the development of critical thinking abilities and the integration of previously siloed scientific disciplines, such as physics, chemistry,

and biology. Moreover, active learning approaches are becoming more and more fundamental in the educational experience.

While we at DSU remain focused on a broad-based biological education, the greater integration with the Department of Exercise and our entry into INBRE offers us an opportunity to expand the health and human anatomy aspects of our program. This is helping the DSU Biology program to become a more expansive, competitive, and forward-facing program moving into the next evaluation cycle. Pairing this diversity in expertise and course options, impressive for a school the size of DSU, with our commitment to hands on learning and integration of technology into the classroom is helping to prepare our graduates for a variety of opportunities both in academics and the world of work.

The program is firmly committed to training students as scientists by emphasizing skills such as hypothesis development, experimental design, and data analysis throughout the program. The development of these skills culminates in the required undergraduate research component of the curriculum. The ability to communicate the process of science in both written and oral modes is emphasized in all stages of the student's program. Students who have both critical-thinking skills and excellent communication skills will have the talents and flexibility to meet the challenges of tomorrow.

Program limitations relative to trends (concerns related to human, financial and physical resource information)

Biology program limitations are primarily linked to human and financial resources. The program is currently staffed with three tenure-track professors, one instructor, and one lab manager who must teach all the sub-disciplines within their respective fields (and then some). In addition, the large numbers of students taking introductory and general education courses consumes a considerable amount of faculty time. Heavy course loads in addition to substantial service requirements limit faculty research productivity and ability to pursue external grants.

Other than the limited SD-EPSCoR funds that the program has had the last five years, the only consistent funding source for equipment and supplies are lab fees charged to students. The amount generated each year is insufficient to finance all the equipment purchases and upgrades needed for a program trying to increase faculty and undergraduate research. Also, the primary purpose of these lab fees is to purchase consumable supplies to directly benefit the fee-paying students, not pay for equipment maintenance. Consequently, lab fees must accumulate for several years before purchases can be made, making it difficult to strategize the purchase of new specialized equipment. For example, molecular biology equipment considered standard in most university lab settings (such as stain-free Western blot equipment) are non-existent at our program, which necessitates significant improvisational teaching on the part of the faculty. Such creativity certainly has the power to inspire our students, but the lack of instrumentation translates into our students entering the professional world lacking essential technical skills. While the faculty continue to actively pursue small grant opportunities for much-

needed new equipment (and existing equipment upgrades), given the constraints of faculty teaching loads (as previously mentioned), they are afforded little time or institutional support for developing competitive grant proposals. Worse, as DSU is not known for its scientific accomplishments, even strong grant proposals for equipment purchases are not well received by major funding agencies. Additionally, there is no institutional support from DSU to dedicate funds to support the maintenance of the equipment that we already have.

When the Science Center was remodeled in 2010, there was no foresight to include lab space dedicated for faculty and student research. Since there are no summer in-person courses, laboratory rooms can be converted into research labs during the summer months, but during the academic year, research progress is not as efficient due to students and faculty having to repeatedly set up and breakdown their experimental set ups. Quality research cannot be done in between classes when the laboratory spaces are open. There are several small alcoves in the Science prep rooms where students can participate in research, but there needs to be more physical space if DSU wants to prioritize research. Collaborators are amazed that DSU biology faculty and students have completed high-quality research projects in the absence of dedicated physical facilities.

These problems make it very difficult for the science faculty to work creatively outside the constraints of teaching demands. However, one strength of the program continues to be its location in the Science Center, with the science and math faculty housed in a single building with recently remodeled classrooms and laboratories. Such proximity under one roof brings faculty from all disciplines together as neighbors, greatly increasing the possibilities of cross-collaborative creativity and continually demonstrating to students the strongly collaborative nature of the scientific enterprise.

Part 3 Academic Programs and Curriculum

Academic Degrees Offered

Currently, students can obtain a Bachelor of Science in Biology with either an Integrative Biology or Biology Education specialization. Students with majors in other programs may elect a Biology Minor.

Curricular Options

In Fall 2023, the biology curriculum was substantively modified to streamline the degree, which will allow for collaboration with other departments. The biology degree was aligned with the exercise science degree (both programs were substantially modified) to allow students to double major with 116 credits. The curriculum proposal has been approved by the Board of Regents and will be put into action in Fall 2024.

Proposed curriculum changes within the biology course selections (to take effect in academic year 2024-2025):

Biology Core		
BIOL 145	Introduction to Scientific Inquiry	1
BIOL 151/151L	General Biology I	4
BIOL 153/153L	General Biology II	4
BIOL 221/221L	Human Anatomy	4
BIOL 311/311L	Principles of Ecology	4
BIOL 331/331L	Microbiology	4
BIOL 335	Introduction to Bioinformatics	3
BIOL 343/343L	Cell and Molecular Biology	4
BIOL 371/371L	Genetics	4
BIOL 498	Undergraduate Research/Scholarship	2
Biology Electives		
Choose 7 credits from of following courses:		
BIOL 201/201L	General Botany	3
BIOL 211/211L	Environmental Biology	3
BIOL 235/235L	Introduction to Biotechnology	3
BIOL 325/325L	Physiology	4
BIOL 365/365L	Vertebrate Zoology	4
BIOL 373/373L	Evolution	4
BIOL 410	Conservation Biology	3
BIOL 422	Immunology	3
BIOL 492	Topics	1-4

Comparison of the program being reviewed with regional programs

There is a great need in South Dakota and the surrounding region for biological science graduates in education, health professions, and industry as evidenced by the high placement rate of our graduates. The demand is especially high for those professionals who have computer science skills and are willing to work remotely. The mission of Dakota State makes it an ideal institution for providing an environment where basic education in biology and allied sciences is integrated with training in computer technology.

Most of the colleges and universities in the region offer biology degrees. All institutions in the South Dakota Regental System have biology programs. The biology degrees at DSU are very different, however, with the emphasis on undergraduate research and integration of computer technology. This also differs from some of the private institutions like Mounty Marty where the heavy influence of the nursing program and health care related fields has a negative impact on other areas of the biological sciences. While student research is possible at Mount Marty, the lack of a close partnering between departments and limited resources meant it was not as high a point of emphasis for those outside of Health Sciences as it is at DSU. Here, we encourage all students to seek out opportunities with faculty, including collaborations between disciplines, according to their interests and needs. This gives our students both the skills they need to succeed at this and the next level and the opportunity to try different aspects of the biological

sciences that are unavailable at other local institutions of this size. Additionally, the DSU Biology Program is more flexible than other regional programs allowing students an opportunity to double major.

Special Strengths of the Biology Program

Interaction Between Faculty and Students

The greatest strength of the biology program is the opportunity for students and faculty to work closely together and develop mentoring relationships. This stems from our program being small, which allows each faculty member to have each student in class several times over the course of their academic career at DSU. The opportunity to interact frequently with students and closely advise them for several years allows the faculty members to provide educational opportunities that more closely match the student's career goals.

Undergraduate Research

The biology program prioritizes student involvement in undergraduate research projects. With these projects, faculty members provide one-on-one mentorship of their research students that closely mimics the graduate school experience. The biology faculty members have built a culture where rigor and involvement are expected in undergraduate research projects. Students are encouraged to begin projects earlier and continue their projects for multiple academic years. Several of the student projects have resulted in presentations at national and regional organizations such as American Phytopathological Society, American Society for Microbiology, World Alfalfa Congress, Gordon Conference on the Origins of Life, American Chemical Society, and the South Dakota Academy of Sciences. A listing of student projects from the last seven years can be found in Appendix B.

Integration of Computer Technology

The biology program at Dakota State University is unusual in the emphasis placed on the use of computer technology both in the classroom and in research. For the Biology Education specialization, students graduate with a computer technology endorsement. All biology majors are required to take two computer science courses, including programming. Additionally, bioinformatics is a required core course for the biology major. Therefore, programing skills are frequently used in capstone student research projects. Though equipment is often slow to arrive at DSU, the biology program emphasizes training students to use the present instrumentation. For example, all biology graduates know how to use a qPCR machine and analyze the resulting data. Finally, all biology students use a citation manager (EndNote) for their academic writing. Students in the Biology Program at DSU are extremely well prepared to use technology following graduation.

The biology faculty have embraced the use of these computers in the classroom and lab. Simulation software (SimBio, Labster), spreadsheets, and graphing programs are used in nearly all courses. In the laboratory, computer technology (in the form of personal computers and instrumentation) has been incorporated as a tool for gathering and/or recording data, analyzing data, and reporting data. Various imaging technologies are utilized in 1) visualization of concepts and processes integral to the understanding of biology in a hands-on laboratory setting; 2) collection of data in a laboratory setting utilizing computer integrated probes; 3) utilization of student-generated data as a foundation for analysis and graphing, interpretation, and presentation; 4) making connections between concepts and skills that will be valuable in all disciplines; and 5) forming a solid foundation for all biology upper-level courses.

Supporting the System-wide Goals for General Education

The biology courses at DSU play a crucial role in the general education curriculum. They are essential to support the goals of thinking critically and analytically, problem solving, developing research skills, and giving students a diverse program of study. Specifically, Biology Survey I and II, General Biology I and II, General Botany, Environmental Biology, Human Health and Biology, General Zoology, and Introduction to Biotechnology meet the goals and outcomes of the system-wide goal for natural science:

Regental General Education Goal (#6): Students will understand the fundamental principles of natural sciences and apply scientific methods of inquiry to investigate the natural world.

> **Student Learning Outcome 1:** Explain the nature of science including how scientific explanations are formulated, tested, and modified or validated.
> **Student Learning Outcome 2:** Distinguish between scientific and non-scientific evidence and explanations and use scientific evidence to construct arguments related to contemporary issues.
> **Student Learning Outcome 3:** Apply basic observational, quantitative, or technological methods to gather and analyze data and generate evidence-based conclusions in a laboratory setting.
> **Student Learning Outcome 4:** Understand and apply foundational knowledge and discipline-specific concepts to address issues, solve problems, or predict natural phenomena.

Student Progression

During their first semester in the program, biology majors take Introduction to Scientific Inquiry (BIOL 145), which is designed to help introduce new students to the services DSU provides that are useful biology majors and build the biology cohort through a group read. The recommended sequence of courses in biology is designed to provide biology majors with an introduction to biological principles in General Biology I (BIOL 151) followed by General Biology II (BIOL 153), which covers diversity of life in

an evolutionary context. Following completion of their first academic year, students are encouraged to take a 200-level biology elective online over the summer, either Introduction to Biotechnology (BIOL 235) or General Botany (BIOL 201). After completing these core courses, students are prepared to take the 300-level courses in biology: Ecology (BIOL 311), Microbiology (BIOL 331), Introduction to Bioinformatics (BIOL 335), Genetics (BIOL 371), and Cell and Molecular Biology (BIOL 343). Students enrolling in Physiology (BIOL 325) must have successfully completed Human Anatomy (BIOL 221). Typically, students will complete BIOL 221 in the fall of their second year followed by BIOL 325 in the spring. Prerequisites for Advanced Special Topics (BIOL 492) are determined by the instructor. Prerequisite courses are recommended, not required, because most of the upper-level courses in biology are offered on a every other year schedule to avoid low enrolled classes. Often students may, unfortunately, not have had the opportunity to take the courses in the preferred sequence. Students must have instructor permission to enroll in Undergraduate Research (BIOL 498), and if they are interested in a career in research, they typically begin taking research credits during their third year.

PLAN OF STUDY

A suggested sequence of courses for Biology students is available in the Course Catalog. The check sheet allows them to plan their semester schedules and time of graduation. The outline is just a model, however, because many upper-level courses are offered on an every other year schedule. Students work closely with their advisor to develop a more accurate plan that meets their circumstances. The plan of study for Biology can be found in Appendix C.

All student records at DSU are accessible to their advisor through the web-based Banner Information interfaces or Trojan Connect (also known as Navigate, a student success management system by EAB). Advisors and students can view schedules and transcripts. They can also perform a program evaluation that indicates which requirements remain in a student's program. The system also allows for online searching of courses, and students may register for classes after consulting with their advisor.

Curriculum Management

The following is a list of the courses in biology currently offered at Dakota State University:

BIOL 101 Biology Survey I (non-majors)	3 credits
BIOL 103 Biology Survey II (non-majors)	3 credits
BIOL 106 Human Health and Biology (non-majors)	3 credits
BIOL 145 Introduction to Scientific Inquiry	1 credit
BIOL 151 General Biology I	4 credits
BIOL 153 General Biology II	4 credits
BIOL 165 General Zoology	4 credits

BIOL 201 General Botany	3 credits
BIOL 211 Environmental Biology	3 credits
BIOL 221 Human Anatomy	4 credits
BIOL 235 Introduction to Biotechnology	3 credits
BIOL 280 Inquiry and Analysis in Biology	2 credits
BIOL 291 Special Problems	1-4 credits
BIOL 292 Topics	1-4 credits
BIOL 311 Principles of Ecology	4 credits
BIOL 325 Physiology	4 credits
BIOL 331 Microbiology	4 credits
BIOL 335 Introduction to Bioinformatics	3 credits
BIOL 343 Cell and Molecular Biology	4 credits
BIOL 365 Vertebrate Zoology	4 credits
BIOL 371 Genetics	4 credits
BIOL 373 Evolution	4 credits
BIOL 410 Conservation Biology	3 credits
BIOL 422 Immunology	3 credits
BIOL 491 Independent Study	1-4 credits
BIOL 492 Topics	1-5 credits
BIOL 498 Undergraduate Research/Scholarship	1-6 credits

Summary of Changes in the Curriculum Since the Last Biology Review.

The Molecular Biology Emphasis and Integrative Biology Emphasis, which were discussed in the previous program review, were eliminated in Fall 2021 when the Integrative Biology and Biology Education specializations were incorporated in the biology degree. The faculty found the required emphasis to be too restrictive and it interfered with timely student graduation. Also, with limited biology faculty members, there was not a robust or consistent number of course offerings in each emphasis.

As mentioned previously, the biology curriculum underwent a substantive modification in Fall 2023. Several degree components were eliminated to simplify the major, and two required biology courses (Introduction to Bioinformatics and Cell and Molecular Biology) were added into the Biology Core to reflect changes in the discipline. Incorporating Bioinformatics into the degree core aligns with the institutional mission to integrate computer technology into degree programs. Inquiry and Analysis in Biology (BIOL 280/280L) and Introduction to Biological Instrumentation (BIOL 303) were removed from the biology major. The content of these classes was moved into other BIOL courses.

The list of electives in the Math and Science Support Component of the major was expanded to include five more exercise science courses. This change was made to give students the opportunity to double major in biology and exercise science.

The number of open elective credits was increased by 15 credits to allow students to choose courses that are appropriate for a wide variety of career options such as science journalism or illustration, environmental law, or agribusiness. Also, the increased number of electives helps support transfer students efficiently complete the degree program.

The course BIOL 323 Human Anatomy and Physiology is unique to DSU within the South Dakota system and was developed many years ago to serve the Health Informatics and Information Management (HIIM) and Respiratory Care programs. This course was replaced by BIOL 106 Human Health and Biology. In addition to serving the online HIIM students, we have found BIOL 106 to be a popular general education offering, so we are planning to offer it in-person in 2025.

Many other DSU programs offer summer online courses for students to get ahead with their degree to possibly graduate a semester early. Many DSU biology majors are athletes and may want to take a reduced course load during their athletics season. Two online biology courses, General Botany (BIOL 201) and Introduction to Biotechnology (BIOL 235), were developed to serve biology majors. Additionally, these courses carry a general education designation, so students from DSU's robust online degree programs also enroll in these courses.

In the 23-24 academic year, Environmental Biology (BIOL 211) and Evolution (BIOL 373) were added to the curriculum as Biology elective options to align with faculty research interests following the retirement of Dr. Droge. The biology program was in need of more elective options because Dr. Droge had taught Aquatic Biology, which we eliminated from the curriculum due to lack of faculty expertise to teach the course.

Dr. Sathoff spent Summer 2023 preparing Introduction to Biotechnology for a Summer 2024 release in the Governors Cyber Academy. The Academy is designed to give high school students a jumpstart into high-demand cyber occupations through transferrable, university-level dual-credit cyber coursework and credit-bearing summer enrichment opportunities. Introduction to Biotechnology will be a Cyber Summer Enrichment offering with a dedicated online section for only Cyber Academy students.

Enrollment Statistics for Course Offerings

Course	2016-17	2017-18	2018-2019	2019-20	2020-21	2021-22	2022-23
BIOL-101 Biology Survey I*	96/81	99/80	95/88	85/61	99/59	90/66	70/29
BIOL-101 Biology Survey I* +	47	40	46	43	48	35	40
BIOL-101 Biology Survey I* (Madison HS, Concurrent Dual Credit)	32	35	24	12	19	21	22
BIOL-103 Biology Survey II*	95/64	18/46	36/44	27/43	13/42	23/46	25/38
BIOL-103 Biology Survey II* +	25	25	25	24	24	25	25
BIOL-145 Intro to Scientific Inquiry	14	10	11	16	11	15	16
BIOL-151 General Biology I*	53	45	57	48	72	38	54
BIOL-153 General Biology II*	28	23	30	36	21	30	24
BIOL-221 Human Anatomy	47	35	35	36	43	19	45
BIOL-280 Inquiry & Analysis in Biology			16	12	15	4	
BIOL-303 Int Biological Instrumentation					17		18
BIOL-311 Principles of Ecology		21		7		12	

BIOL-323 Human Anatomy & Physiology +	23/22	9/19	12/15	10/15	12	9	
BIOL-325 Physiology	16	19	17	14	14	25	14
BIOL-331 Microbiology	14	13	14	9	10	9	11
BIOL-335 Introduction to Bioinformatics				13		14	
BIOL-343 Cell and Molecular Biology	14		13		14		17
BIOL-365 Vertebrate Zoology	13				13		
BIOL-371 Genetics		19		14		11	
BIOL-410 Conservation Biology		11				13	
BIOL-422 Immunology			8				12
BIOL-450 Aquatic Biology	11				3		
BIOL-491 Independent Study		4	24	6	3	10	
BIOL-492 Topics	13		9		10	10	16
BIOL-498 Undergrad Research/Scholarship	1/8	2	5/5	4/2	2/4	6/6	8/7

/ If offered in both semesters, fall and spring enrollments reported respectively.
* Courses that may be taken in fulfillment of general education requirements.
+ Online only sections

Enrollment for Summer Biology Course Offerings

Course	2017SU	2018SU	2019SU	2020SU	2021SU	2022SU	2023SU
BIOL-101 Biology Survey I*+				24	19	15	20
BIOL-106 Human Health and Biology*+						14	24
BIOL-165 General Zoology*+	17	14	18	13	14		
BIOL-201 General Botany*+					18	15	12
BIOL-235 Introduction to Biotechnology*+							14
BIOL-323 Human Anatomy & Physiology+	7	8	4				
BIOL-491 Independent Study	1						
BIOL-592 Topics: Mixed Grass Prairie		6	10			12	9

Relationships with Other Programs at Dakota State University

The Biology Education Specialization is cooperatively administered through the biology program and College of Education. Dr. Kristel Bakker, Professor of Biology, is the academic advisor for biology education students and a member of the campus Professional Education Council. The Biology Education Specialization has a reduced number of Biology Electives (see below) and Math and Science Component because these students also take nearly 30 credits of education classes and complete a one semester student teaching internship.

Biology Component for Biology Education Specialization (6 Credits)

Choose 6 credits from the following:

- BIOL 201/201L - General Botany (3 credits)
- BIOL 211/211L – Environmental Biology (3 credits)
- BIOL 325/325L - Physiology (4 credits)
- BIOL 365/365L - Vertebrate Zoology (4 credits)
- BIOL 410 - Conservation Biology (3 credits)
- BIOL 422 - Immunology (3 credits)
- BIOL 492 - Topics 1-5 credits

Many of the courses in the biology program are required for students in other majors. Students in Health Information Management take BIOL 101 Biology Survey I and BIOL 106 Human Health and Biology.

Students in the Exercise Science program are required to take BIOL 151 General Biology, BIOL 221 Human Anatomy, and BIOL 325 Physiology. The list of elective support courses includes BIOL 311 Ecology, BIOL 331 Microbiology, BIOL 335 Introduction to Bioinformatics, BIOL 343 Cell and Molecular Biology, and BIOL 371 Genetics. Previously, there has been little collaboration between departments, but, as mentioned earlier, both the exercise science and biology curriculums were modified and aligned in Fall 2023. We are hopeful that the pre-health students will take advantage of these changes, which will allow for a double major. DSU marketing has promoted these changes and highlighted our programs.

Biology Minor

Students in other majors, especially secondary education, may select a minor in biology. A minor in biology consists of the following courses:

Pref.	**Num.**	**Title**	**Cr. Hrs.**
Biology			**19-21**
BIOL	151	General Biology I	4
BIOL	153	General Biology II	4
Choose 11-12 credits from the following:			
BIOL	221	Human Anatomy	4
BIOL	311	Principles of Ecology	4
BIOL	331	Microbiology	4
BIOL	335	Intr. To Bioinformatics	3
BIOL	343	Cell and Molecular Biology	4
BIOL	325	Physiology	4
BIOL	365	Vertebrate Zoology	4
BIOL	371	Genetics	4
BIOL	410	Conservation Biology	3
BIOL	422	Immunology	3
SEED	303	Secondary/Middle Content Area:Minor*	1
		*Required for Education Majors Only	

Instructional Methodologies

The faculty use a variety of instructional methods including lecture, laboratory, multimedia, and use of other computer technology. Most classes involve at least a moderate degree of lecture and discussion. For example, Dr. Sathoff emphasizes active learning in his courses, so his students are frequently doing some type of activity after approximately every 10 minutes of lecture. Also, there is a focus on reading primary literature in a Journal Club setting because understanding primary scientific literature is a difficult, essential skill that takes some time to develop. Field trips to gain experience in field research, to make observations in a natural setting, and to meet professionals in the field are taken in nearly all of Dr. Bakker's courses, including Biology 101 and BIOL 211. This is an extremely unique opportunity for students in general education classes due in part to the small size of DSU. During BIOL 335, Dr. Dececchi includes in class activities using the bioinformatics software discussed that week. This gives students a chance to "test it out, get messy and make mistakes" with the software in a controlled setting. Over the last several years, a greater emphasis has been placed on oral and written presentations by students. Computer use in the classroom and laboratory is required and creative ways to integrate technology are highly encouraged.

Part 4 Program Enrollments, Retention, and Student Placement

Total Enrollment

Program enrollment is based on the number of students enrolled in at least one DSU class with an active program of Biology (BS) as of fall census.

University and college enrollment is based on the number of students enrolled in at least one DSU class as of fall census. If a student is enrolled in multiple programs, they are only counted once at the university level.

Table 1. Biology Programs, College, and University Enrollments

	Fall 2016	Fall 2017	Fall 2018	Fall 2019	Fall 2020	Fall 2021	Fall 2022	Fall 2023
Biology for Information Systems (BS)	40	34	9	3	1			
Biology Education (BSED)	5	5	4	5	4	1		
Biology (BS)			22	27	26	33	37	37
College of Arts & Sciences	384	391	366	369	325	337	332	315
University Enrollment	3190	3307	3382	3268	3186	3219	3241	3509

Table 2. Student Diversity – Gender & Ethnicity

	Fall 2016	Fall 2017	Fall 2018	Fall 2019	Fall 2020	Fall 2021	Fall 2022	Fall 2023
Biology for Information Systems (BS)								
Gender								
Female	26	16	3	2	1			
Male	14	18	6	1	0			
Ethnicity								
White	33	31	8	2	0			
Other Races/Unknown	7	3	1	1	1			
Biology Education (BSED)								
Gender								
Female	4	2	0	1	2	0		
Male	1	3	4	4	2	1		
Ethnicity								
White	5	5	4	5	4	1		
Other Races/Unknown	0	0	0	0	0	0		
Biology (BS)								
Gender								
Female			12	17	13	17	18	21
Male			10	10	13	16	19	16
Ethnicity								
White			18	19	21	22	22	21
Other Races/Unknown			4	8	5	11	15	16
College of Arts & Sciences								
Gender								
Female	189	181	176	168	134	139	126	130
Male	195	210	190	201	191	198	206	185
Ethnicity								
White	319	318	302	290	257	264	258	237
Other Races/Unknown	65	73	64	79	68	73	74	78
University Diversity								
Gender								
Female	1355	1325	1340	1196	1139	1194	1156	1279
Male	1835	1982	2042	2072	2047	2025	2085	2230
Ethnicity								
White	2553	2674	2714	2592	2534	2541	2493	2619
Other Races/Unknown	637	633	668	676	652	678	748	890

Other Races/Unknown includes all students who are not classified as "white" based on ethnicity, including students who identify themselves as Hispanic/Latino, are multiple races including white, and those classified as a U.S. nonresident.

Degrees Awarded

Table 3. Number of Degrees Awarded by Academic Year

	Academic Year 2016-17	Academic Year 2017-18	Academic Year 2018-19	Academic Year 2019-20	Academic Year 2020-21	Academic Year 2021-22	Academic Year 2022-23
BS in Biology for Information Systems	4	6	2	3	0	0	0
BSED in Biology Education	0	1	1	1	0	1	0
BS in Biology			3	5	2	8	5
College of Arts & Sciences	69	80	62	113	78	99	89
University	470	478	454	558	543	519	583

Degrees awarded is representative of all program completions at the associate, bachelors, masters, and doctoral level; for example, if a student received a bachelor's degree in both math and science, they would be counted twice at the college and university level. Certificates are not included.

An academic year is defined as summer, fall, and spring for the purpose of this report.

Persistence

Persistence is defined as: The proportion of a student cohort who enrolled for the first time in a given fall semester and then re-enrolled in a subsequent spring semester. The student must be enrolled in at least one DSU class to be considered persisted. For persistence purposes, specific populations are used: (1) first-time, full-time, baccalaureate degree-seeking freshmen; (2) incoming degree-seeking transfers (includes part-time and full-time). A student may be counted more than once. If the student is seeking multiple majors, they will be counted in each major.

Table 4. Persistence Rates for First-time, Full-time, Baccalaureate Degree-seeking Freshmen (Fall 2016 to Fall 2022 Cohorts)

	Fall 2016 Cohort		Fall 2017 Cohort		Fall 2018 Cohort		Fall 2019 Cohort	
	Number of Students	% Returned in Spring	Number of Students	% Returned in Spring	Number of Students	% Returned in Spring	Number of Students	% Returned in Spring
Biology Information Systems	10	90%	4	75%				
Biology Education	2	100%			1	100%		
Biology					9	89%	13	92%
College of Arts & Sciences	63	78%	70	90%	60	87%	82	88%
University	305	86%	355	88%	377	86%	399	89%

	Fall 2020 Cohort		Fall 2021 Cohort		Fall 2022 Cohort	
	Number of Students	% Returned in Spring	Number of Students	% Returned in Spring	Number of Students	% Returned in Spring

Biology Information Systems						
Biology Education						
Biology	4	75%	13	77%	10	100%
College of Arts & Sciences	63	79%	68	88%	65	95%
University	355	83%	345	90%	355	90%

N=total number of students
% Ret 2nd semester = the percentage of students from the cohort who registered for at least one DSU class in the subsequent spring.

Table 5. Persistence Rates for Incoming Degree-Seeking Transfers (Fall 2016 to Fall 2022 Cohorts)

	Fall 2016 Cohort		**Fall 2017 Cohort**		**Fall 2018 Cohort**		**Fall 2019 Cohort**	
	Number of Students	% Returned in Spring	Number of Students	% Returned in Spring	Number of Students	% Returned in Spring	Number of Students	% Returned in Spring
Biology Information Systems	4	100%	2	100%				
Biology Education							3	67%
Biology					2	50%	1	0%
College of Arts & Sciences	30	80%	27	78%	27	74%	35	83%
University	272	79%	289	82%	251	75%	245	78%

	Fall 2020 Cohort		**Fall 2021 Cohort**		**Fall 2022 Cohort**	
	Number of Students	% Returned in Spring	Number of Students	% Returned in Spring	Number of Students	% Returned in Spring
Biology Information Systems						
Biology Education	1	100%				
Biology	2	50%	3	100%	4	100%
College of Arts & Sciences	19	84%	23	87%	23	78%
University	160	77%	183	84%	210	80%

Number of Students=all students in the starting cohort of transfer students, including both part-time and full-time transfers.
% Returned Next Spring = the percentage of students from the cohort who registered for at least one DSU class in the subsequent spring.

Retention

Retention is defined as: The proportion of a student cohort who enrolled for the first time in a given fall semester and then re-enrolled in a subsequent fall semester. The student must be enrolled in at least one DSU class to be considered retained. For retention purposes, specific populations are used: (1) first-time, full-time, baccalaureate degree-

seeking freshmen; (2) incoming degree-seeking transfers (includes part-time and full-time). A student may be counted more than once. If the student is seeking multiple majors, they will be counted in each major.

Table 6. Retention Rates for First-time, Full-time, Baccalaureate Degree-seeking Freshmen (Fall 2016 to Fall 2022 Cohorts)

	Fall 2016 Cohort		Fall 2017 Cohort		Fall 2018 Cohort		Fall 2019 Cohort	
	Number of Students	% Returned Next Fall	Number of Students	% Returned Next Fall	Number of Students	% Returned Next Fall	Number of Students	% Returned Next Fall
Biology Information Systems	10	80%	4	50%				
Biology Education	2	100%			1	100%		
Biology					9	56%	13	77%
College of Arts & Sciences	63	68%	70	64%	60	63%	82	65%
University	305	72%	354	67%	376	66%	399	71%

	Fall 2020 Cohort		Fall 2021 Cohort		Fall 2022 Cohort	
	Number of Students	% Returned Next Fall	Number of Students	% Returned Next Fall	Number of Students	% Returned Next Fall
Biology Information Systems						
Biology Education						
Biology	4	75%	13	69%	10	80%
College of Arts & Sciences	63	75%	68	71%	66	83%
University	355	72%	345	75%	354	75%

Number of Students=all students in the starting cohort of students
% Returned Next Fall = the percentage of students from the cohort who registered for at least one DSU class in the subsequent fall.

Table 7. Retention Rates for Incoming Degree-Seeking Transfers (Fall 2009 to Fall 2016 Cohorts)

	Fall 2016 Cohort		Fall 2017 Cohort		Fall 2018 Cohort		Fall 2019 Cohort	
	Number of Students	% Returned Next Fall	Number of Students	% Returned Next Fall	Number of Students	% Returned Next Fall	Number of Students	% Returned Next Fall
Biology Information Systems	4	50%	2	100%				
Biology Education							3	67%
Biology					2	0%	1	0%
College of Arts & Sciences	30	67%	27	52%	27	52%	35	51%
University	272	64%	289	62%	251	56%	245	62%

	Fall 2020 Cohort		Fall 2021 Cohort		Fall 2022 Cohort	
	Number of Students	% Returned Next Fall	Number of Students	% Returned Next Fall	Number of Students	% Returned Next Fall
Biology Information Systems						

Biology Education	1	0%				
Biology	2	50%	3	67%	4	75%
College of Arts & Sciences	20	40%	23	61%	23	61%
University	207	57%	183	60%	210	62%

Number of Students=all students in the starting cohort of transfer students, including both part-time and full-time transfers.
% Returned Next Fall = the percentage of students from the cohort who registered for at least one DSU class in the subsequent fall.

Graduation Rates

Table 8. Graduation Rates for First-time, Full-time, Baccalaureate Degree-seeking Freshmen (Fall 2011 to Fall 2017 Cohorts)

	Fall 2011 Cohort			Fall 2012 Cohort			Fall 2013 Cohort		
	Total Number of Students in Cohort	Graduated within 5 years	Graduated within 6 years	Total Number of Students in Cohort	Graduated within 5 years	Graduated within 6 years	Total Number of Students in Cohort	Graduated within 5 years	Graduated within 6 years
Biology Information Systems	6	50%	50%	13	62%	69%	9	56%	56%
Biology Education	2	0%	0%	2	0%	0%			
College of Arts & Sciences	74	30%	35%	69	38%	45%	63	33%	33%
University	275	32%	35%	283	37%	43%	276	37%	38%

	Fall 2014 Cohort			Fall 2015 Cohort		
	Total Number of Students in Cohort	Graduated within 5 years	Graduated within 6 years	Total Number of Students in Cohort	Graduated within 5 years	Graduated within 6 years
Biology Information Systems	3	0%	0%	6	67%	67%
Biology Education	4	25%	25%	1	100%	100%
College of Arts & Sciences	52	35%	40%	66	41%	44%
University	263	43%	47%	320	42%	45%

	Fall 2016 Cohort			Fall 2017 Cohort		
	Total Number of Students in Cohort	Graduated within 5 years	Graduated within 6 years	Total Number of Students in Cohort	Graduated within 5 years	Graduated within 6 years
Biology Information Systems	10	40%	50%	4	50%	50%
Biology Education	2	50%	50%			
College of Arts & Sciences	66	39%	41%	70	44%	44%
University	305	42%	46%	354	47%	48%

N=number of students; % = the percentage of students from the cohort who graduated.

Employment potential and placement

Nearly 100% of graduates of the biology degree program found placement in either an appropriate position or chose to continue their education in graduate school. The following table shows positions and geographic locations of biology degree graduate placement since the last biology program review.

Table 9. Placement descriptions of program graduates.

Year	Placement
2017	Natural Resource Management MS program, South Dakota State University
	Science Teacher, Watertown School District, SD
	Administrative Assistant, Rapid City Regional Hospital, SD
	Radiology technician program, UnityPoint Health, IA
2018	Physician assistant school, Rocky Mountain College, MT
	Pharmacy school, South Dakota State University
	Physical therapist assistant program, Lake Area Technical Institute
	U.S. Natural Resource Conservation Service, Pierre, SD
2019	Virology and Gene Therapy PhD program, Mayo Clinic Graduate School, MN
	PhD program, University of California
	Doctor of Veterinary Medicine program, Oregon State University
	Doctor of Veterinary Medicine program, Colorado State University
	Great Plains Zoo, Sioux Falls, SD
	Science teacher, Ellsworth School District, MN
2020	Biology teacher, Sioux Valley School District, SD
	ER Admissions Specialist, Avera McKennan Hospital, Sioux Falls, SD
	Health Coach, Registered Dietician, Carr Chiropractic Clinic, Huron, SD
	Terminating Solutions, Wind turbine technician, Sioux Falls, SD
	Crewmember, US Coast Guard, Polar Star Icebreaker (Antarctic ship)
2021	Optometry school, Massachusetts College of Pharmacy and Health Sciences
	Ocean kayaking guide and naturalist, Hawaii
2022	Accelerated nursing program, South Dakota State University
	Dental school, University of Minnesota
	Law School (focusing on Healthcare Administration Law), University of South Dakota
	Park Ranger, Pipestone National Monument, MN
	Naturalist, Lake Herman State Park, SD
	Science Teacher, Hamlin High School, SD
	Cross Country Head Coach, Garden City Community College, KS -MS in Sports Administration program
	Teaching MA program, Valley City State University, SD
2023	Clinical Mental Health Counseling graduate program, University of Northern Iowa
	Accelerated nursing program, South Dakota State University
	Patient care technician, Avera McKennan Hospital, Sioux Falls, SD
	Mortuary school, Iowa State University
	Chiropractic Assistant, Madison, SD

Part 5 Faculty Credentials

The faculty listed below are the principal instructors in the program.

Kristel Bakker, Professor of Biology, Ph.D., South Dakota State University

Dr. Bakker has been at DSU since 2000. She teaches the BIOL 101 survey course for non-majors each semester. She also teaches BIOL 211 Environmental Biology, BIOL 311 Ecology, BIOL 365 Vertebrate Zoology, BIOL 410 Conservation Biology, and special topics courses on histology and animal behavior.

Andrew Sathoff, Assistant Professor of Biology and Science Coordinator, Ph.D., Univ. of Minnesota

Dr. Sathoff came to DSU in 2019. He has taught a variety of courses over the past four years, but currently is responsible for the first semester of general biology (BIOL 151), the freshmen orientation course (BIOL 145), BIOL 331 Microbiology, BIOL 343 Cell and Molecular Biology, and BIOL 371 Genetics. He also teaches Honors Integrated Science (ASC 121) to support the General Beadle Honors Program. Over the summers, Dr. Sathoff teaches online BIOL 201 General Botany and BIOL 235 Introduction to Biotechnology.

Alex Dececchi, Assistant Professor of Biology, Ph.D., McGill University

Dr. Dececchi is the newest member of the faculty in just his first year on campus. He teaches the second semester of general biology (BIOL 153), BIOL 221 Human Anatomy, BIOL 325 Physiology, BIOL 335 Bioinformatics, and occasional special topics courses on evolution and human functional anatomy. This summer he is scheduled to teach online BIOL 165 General Zoology.

Nevine Nawar, Senior Lecturer of Biology, Ph.D., Univ. of Alexandria, Egypt

On campus, Dr. Nawar teaches the first and second semester of the non-majors biology sequence (BIOL 101 and BIOL 103) each semester. She teaches online sections of both BIOL 101 and 103 as well as a BIOL 106 Human Health and Biology.

Reagan Schaeffer, Instructor and Lab Manager, M.S., South Dakota State University

Ms. Schaeffer was hired as lab manager near the end of 2023. She teaches laboratory sections of BIOL 101, BIOL 103, BIOL 151, and BIOL 153 with an average of two lab sections per semester.

Dr. Dale Droge, Professor of Biology Emeritus, Ph.D., University of Illinois, retired May 2022 after 30 years of excellent service to Dakota State University.

A vita for each current faculty member are in Appendix F.

The faculty listed below teach required math and science support courses:

Hannah Altmann, Ph.D., Assistant Professor of Mathematics
Rich Avery, Ph.D., Professor of Mathematics
Luke Chowning, Ph.D., Assistant Professor of Exercise Science
Jeffery Elbert, Ph.D., Assistant Professor of Chemistry
Peng Guo, Ph.D., Assistant Professor of Physics
Jeffrey Palmer, Ph.D., Professor of Mathematics
Rich Wicklein, Ph.D., Assistant Professor of Mathematics

Anticipated Changes in Staffing

With the recent hiring of a lab manager (Reagan Schaffer), staffing in the program is adequate for current enrollment. Though if enrollment does increase by as little as 10 biology students per class, the biology program would need another faculty line. The increased enrollment would lead to upper-level classes being offered yearly, and the new faculty member would help share the intense time commitment to mentor each student in BIOL 498 with individual research projects.

The lab manager assists with the ordering of supplies and equipment for the labs, setting up and taking down laboratories, as well serving as the instructor of several introductory biology lab sections. The manager also is responsible for all recordkeeping entailed in the use of chemicals, preserved specimens, or live animals in teaching exercises, and they must ensure compliance with OSHA, EPA, and USDA regulations. Although the manager position has been a great help, there is still a large load on faculty to prepare for upper-level laboratories such as microbiology, genetics, and molecular biology.

Faculty or Student Research

Dr. Kristel Bakker

Growing up in rural South Dakota has given me a deep appreciation for the prairie and a passion to further existing research on how to preserve and restore grassland habitats for wildlife. Ecosystems of the northern Great Plains have been transformed from vast mosaics of grasslands into fragmented agricultural landscapes characterized by large blocks of cropland interspersed with smaller, more isolated grassland patches. As such, we need to know how species function in these fragmented landscapes. My research interests encompass all areas of prairie ecology, but most specifically, the conservation and management of grassland birds (waterfowl, upland game and nongame species). My research projects incorporate both local and landscape level habitat variables because insights into how birds perceive grassland habitats at various scales enhance our ability to direct grassland conservation locally and over broad geographic regions.

I strongly believe in conducting applied research. I have published approximately 40 papers in scientific journals and presented at nearly 100 local, state, national, and international meetings. Our results, however, mean very little if they are not conveyed to habitat managers and implemented in the field. Communicating with managers to ensure the research completed meets their needs and to share our recommendations is critical to the conservation and management of species. To this end, I have consulted with state and federal government and private agencies on how to best manage habitats for grassland birds and have received funding for research projects from the South Dakota Department of Game, Fish, and Parks, Competitive State Wildlife Grants, and the United States Fish and Wildlife Service. Current and past projects include nesting studies on nongame birds, waterbirds, ring-necked pheasants and waterfowl in eastern South Dakota, habitat and distribution studies of nongame birds and the burrowing owl in western South Dakota, and the development of a long-term grassland bird monitoring plan for South Dakota. I collaborate with professors from South Dakota State University and am the thesis advisor for SDSU M.S. students. I completed the All Bird Conservation plan and developed a long-term monitoring plan for grassland birds of greatest conservation concern for the South Dakota Game, Fish and Parks and completed the South Dakota Species of Habitat Fragmentation Concern: Grassland Birds report for the U.S. Fish and Wildlife Service, South Dakota Ecological Services Field Office.

Dr. Andrew Sathoff

After obtaining my PhD in Plant Pathology from the University of Minnesota, I knew that I wanted to go somewhere to apply my research in more of an extension plant pathology setting to help serve growers. My crop specialty is alfalfa, and I was first attracted to this position at DSU because South Dakota plants some of the most acres of alfalfa in the US, yet there are very few dedicated alfalfa researchers in the state. Therefore, my expertise was needed in South Dakota. During my first three summers at DSU, I conducted alfalfa pathology research with groups of DSU undergraduate students for 10 weeks in an REU type of setting. The research groups grew each year from two to three to four undergraduate students. I managed to obtain healthy student stipends from South Dakota EPSCoR for the students, and my time for the first two summers was funded externally by research contracts from Mustang Seeds, a local seed company. Our work focused on surveying South Dakota for *Aphanomyces euteiches* and uncovering the race structure of the pathogen, identifying and characterizing South Dakota *Pythium* sp. for pathogenicity against alfalfa, evaluating commercial biocontrol treatments against alfalfa pathogens, and using bioinformatics to complete a functional analysis of *A. euteiches* to try to uncover mechanisms of alfalfa resistance. Each year, the students presented their work at national (Plant Health 2021, 2022, and 2023) or international conferences (World Alfalfa Congress). Also, DSU was able to cover the travel expenses for these students. Manuscripts from this work were composed by the students and published in peer reviewed journals (*Plant Disease* and *Plant Pathology*) and South Dakota State University extension articles, which reach local growers. For these research efforts, Dr. Sathoff was presented with the Merrill Hunter Award for Excellence in Research the in 2022, which is awarded to DSU's top researcher.

Recently, I've gotten involved with the scholarship of teaching and learning (SoTL). I serve as a senior editor in my discipline's journal of education, *Plant Health Instructor*, and have published work that was completed with my team of undergraduate students in that journal. I have another manuscript nearly ready for submission, but as mentioned in this self-study faculty workloads are extremely high and interfere with research productivity.

In addition to working on alfalfa pathology projects, I frequently help students design projects based on their interests. When students take ownership of their projects, they become empowered, which can lead to some fantastic results. Currently, I am working on two promising projects on the antimicrobial activity of honey and a Snake Fungal Disease survey, which we hope to present at national conference during Summer 2024.

Dr. Alex Dececchi

My background is in evolutionary biology, paleontology, and functional anatomy with much of my work focuses on patterns and process in evolution, especially at major locomotory transitions in vertebrates. I only recently joined DSU in the fall of 2023 and as such have only begun to apply for internal funding to build my lab, but I intend to focus on opportunities for student led projects in all subjects of my research. I have begun this process by presenting at the DSU Research Colloquium and the 83rd annual meeting of the Society of Vertebrate Paleontology where I highlighted previous work and how it could be implemented at DSU. Branching off this I have started several short- and long-term project in collaboration with the North Dakota Geological Survey, The University of Hong Kong, UCLA and McGill University as well as Beacom College and the Math Department of DSU, to integrate AI technology with paleontology and evolutionary theory.

Previous to joining DSU I published more than 30 peer review journal articles, have co-chaired international symposia on the origin and early evolution of flight and have presented at conferences at the local, national and international level. I am an academic editor for the journal PLoS One, as well as a reviewer on multiple papers per year on the topics of dinosaur evolution, flight originations and biomechanics. Currently I am a part of several international collaborations spinning out of previous projects and presentations which will in the coming years involve more and more DSU students.

Dr. Nevine Nawar

Collaborates with faculty and mentors graduate students in the College of Business and Information Systems to work on research that focuses on information technology in public health and health determinants.

Biology faculty are actively involved with student research projects. Many of these projects are listed in Appendix B.

Service to Community

Dr. Bakker has served on several DSU committees including: Assessment, Secondary Education Coordinating, Professional Education Coordinating, Human Subjects, Faculty Research, Animal Care and Use, Grade Appeal, Readmission, Search committees for the Vice President of Academic Affairs and Dean of the College of Arts and Sciences as well as Biology, Exercise Science, Chemistry and Physics faculty positions. Additionally, she has been a member of several Master's (SDSU) and Ph.D. Program Committees (USD, SDSU). Professionally, she serves as a peer referee for several journals, shares her research results with public agencies and belongs to several professional organizations. Kristel was the treasurer and an executive board member of the South Dakota Academy of Sciences from 2001-2008 and is a current executive board member of the South Dakota Ornithologists' Union. She is currently on the steering committee for the South Dakota Grassland Coalition Bird Tour and the South Dakota Breeding Bird Atlas Technical Committee. Dr. Bakker has taught bird identification at the South Dakota Game, Fish and Park's Becoming an Outdoor Woman workshops, leads educational activities at local state parks, at the South Dakota Grassland Coalition's Bird Tour, and for elementary and high school students.

Dr. Sathoff began serving as the Academic Coordinator for the science programs within the College of Arts and Sciences in 2023 following the retirement of long-time Science Coordinator, Dr. Dale Droge. A year after coming to campus, Dr. Sathoff obtained a charter for a chapter of Beta Beta Beta (TriBeta), which is the national biology honor society. He serves as the chapter's advisor, which keeps him busy because the chapter is very active hosting speakers and designing outreach events. Also, he is a favorite of the Admissions Office to meet with interested students and represent DSU during recruitment visits. He is one of Dakota State University's representatives to the Science Discipline Council that includes all public universities in South Dakota. On campus, he has served on the Athletics Committee and currently serves on the Curriculum, Honors, and Research Committees. Dr. Sathoff is a popular choice for Search Committees having served searches for the Dean of the College of Arts and Sciences as well as Biology, Exercise Science, Chemistry, and Physics faculty searches all within the last two years. Professionally, he maintains several active collaborations with researchers at other institutions including the USDA and regularly presents research findings with his undergraduate students at conferences, most commonly held by the American Society for Phytopathology (APS), the South Dakota Academy of Sciences, and the Midwest Forage Association. In service to APS, he serves as the Chair of the Teaching Committee. Dr. Sathoff remains engaged with local alfalfa growers and helped found the Northern Plains Forage Association where he serves as a non-voting board member.

Dr. Dececchi: As a new hire, my service opportunities have been limited. Beyond the professional work as an academic editor at PLoS One, I have joined the the Emeritus Faculty Selection Committee for a 3-year term. I look forward to contributing to this valid aspect of the university community moving forward. I also met with and helped advise on the selection of the new Science Lab Manager, culminating in our hiring of one who started in December of 2023. I have very recently been in discussions about

becoming the DSU liaison as we seek to become a member institution of the South Dakota Biomedical Research Infrastructure Network **(**BRIN).

Dr. Nawar participates in main Women in Science events in the State and reached out to potential donors to secure the provision of personal protective equipment to Indian Reservations during the COVID-19 pandemic. She is currently organizing a Women in STEM day at DSU.

Description of Student Organizations

Many biology students belong to DSU's chapter of Beta Beta Beta (TriBeta). TriBeta is the national biological honor society, and DSU was awarded a chapter charter in 2021. DSU students (primarily biology and exercise science majors) apply for induction into the club during the second semester of their sophomore year. Dr. Sathoff serves as the chapter's faculty advisor. DSU's chapter runs science educational outreach activities with students in local elementary and middle schools and helps facilitates a Scrubs Camps with the Health Informatics and Health Information Management Program in the College of Bussiness. Also, TriBeta invites speakers to campus, which contributes to the campus's research culture and serves the university and community.

Part 6 Academic and Financial Support

Resources providing academic support to faculty and students in Biology include the Karl E. Mundt Library, a wireless computer infrastructure, and classrooms and laboratories equipped with computer projection systems.

Karl E. Mundt Library and Learning Commons

The Karl E. Mundt Library provides a wide range of library services as well as a diverse collection of reference and informational materials for the use of the faculty and staff of Dakota State University. The library exists to serve as an archive of accumulated knowledge, a gateway to scholarship, and a catalyst for the discovery and advancement of new ideas. In fulfilling its obligation to provide knowledge to the University and the scholarly community at large, the library collects, organizes, and provides access to recorded knowledge in all formats. The library faculty initiates discussions and proposes creative solutions to the information challenges facing the University and the scholarly community. The library's faculty and staff actively participate in providing quality service, access, instruction, and management of scholarly information. It is one of the main sources of knowledge and reference for students in mathematics.

The mission of the Karl E. Mundt Library is to meet the information needs of the students, faculty, and staff of Dakota State University and to support the University's stated mission and goals. The college and library faculty work together to plan the development of library resources in order to purchase the most appropriate materials to achieve the educational

objectives of Dakota State University. The total collection contains approximately 52,000 physical items as well as 110 periodical databases (the vast number of which are full-text) and covering every discipline.

The Karl E. Mundt Library boasts wide ranging and easy access to the resources needed by anyone pursuing a science-related research topic. The library subscribes to several science related databases including: Web of Science, BIOSIS Preview, SciFinder, and IOP Science in addition to several interdisciplinary databases such as EBSCO Academic Search Premier and ProQuest Research Library. The library also provides access to large e-book collections. For those items that are not available via full text, they are readily obtainable through interlibrary loan.

The college and library faculty also work together to provide instruction for students on conducting research and utilizing the resources available from the library. Librarians lead course sessions on how to effectively find resources in discipline specific databases as well as how to organize research using citation manager tools such as EndNote. The library supports the academic needs of the science students and faculty.

Computer Infrastructure

Each faculty member is provided with a laptop computer, most recently a Dell tablet PC. Memory or other special upgrades and accessories may be requested. A new initiative seeks to replace faculty computers every three years.

Within the unit of Computing Services, the Network Services group is responsible for planning, implementing, and securing network services for campus computing resources. A variety of servers in the Server Room provides applications hosting home directories, web space, email, and other central applications. Network Services operates a Repair Center, staffed primarily by students, to quickly respond to any computing or network access problems in campus offices or with students tablet PCs.

Advisory and Support Staff

Mark Spanier, Interim Dean of Arts and Sciences
Andrew Sathoff, Science Coordinator
Mary Francis, Director of the Karl E. Mundt Library
Pam Lewis, Administrative Assistant for the College of Arts and Sciences
Shawn Jaacks, Chief Information Officer
Sarah Rasmussen, Director of Online Education
Tyler Steele, System Administration Manager

Financial Support

There are two sources of funds that support the biology program. State funds are allocated to the College of Arts and Sciences and are used for general operating expenses

of the Science Center and support of instruction including printing, office supplies, and some support of travel. The funds in this account are shared by all disciplines in the college.

In addition to the resources available through state funds allocation, a discipline fee of $21.20 per credit hour is assessed for each student taking a science course. These lab fees are placed in a local account and support courses in Biology and Physical Science. The amount of fees placed into the local accounts averages about $35,000 per year. Funds that remain in the lab fees account at the end of the fiscal year are placed in a reserve account. The Science Program Coordinator supervises both accounts.

Additionally, faculty may apply for funds from the College Profession Development Fund to travel to conferences, engage in in-service training, or otherwise support their research/scholarly activities. This fund was formerly held in the Office of the Provost but is now a part of the individual College budgets. The Biology Program at DSU has consistently received support from the College budget. On average, each faculty member gets ~$2000 to travel to at least one conference an academic year.

Budget for Science Program 2016-2023

Fiscal Year	Operating Budget	Fee Revenue
2016	$60,600	$44,573
2017	$60,955	$45,192
2018	$60,385	$41,507
2019	$60,385	$45,783
2020	$58,791	$44,876
2021	$58.791	$43,870
2022	$58,791	$42,466
2023	$58,791	$28,631*

* Lab fee revenue was low in 2023 because physics and chemistry courses were taught online due to on-going searches for on-campus instructors.

The year-to-year variability in local funds reflects amounts transferred from the carryover reserve saved from previous years. For years prior to this review period, major equipment was purchased to upgrade the teaching labs and support research opportunities.

Fiscal Year	Carryover Reserve
2016	$ 44,574
2017	$ 30,937
2018	$ 30,851
2019	$ 35,420
2020	$ 55,778
2021	$ 67,539
2022	$ 91,919
2023	$ 94,804

Major financial concerns

It is expected that state support of the College of Arts and Sciences, and therefore of the biology program, will continue at current levels. Lab fees are generally adequate to fund the costs of basic supplies for classroom activities and low-cost equipment. But, if DSU is truly committed to supporting student research, which requires major equipment purchases and upkeep so faculty can carry out their research, there needs to be increased institution support in the form of line items in the budget for both equipment maintenance and student research.

Part 7 Facilities and Equipment

Ruth Habeger Science Center

In 2010, a 5-million-dollar extensive renovation of the DSU Science Center was completed. The building did not increase in size, but every room was remodeled and updated. Faculty offices were moved to the outside of the building, and classrooms were added to the central area. The following statements describe rooms of the Science Center that are frequently used by the biology program faculty and students (floor plan diagram can be found at end of this section):

Advanced Biology Lab Room 101 (1215 sq. ft.)

Upper division laboratory courses are taught in this space such as microbiology, cell and molecular biology, and genetics. The benches are equipped as individual work stations with gas jets, drawers, and access to sinks. Equipment in the room includes a laminar flow hood, a -80 C freezer, a -20 C freezer, two refrigerators, 3 incubators, a shaking incubator, and two plant growth chambers. Safety precautions like eyewash stations and showers are incorporated into the design of this and all the other laboratory rooms.

Biology Preparation and Storage 102/103 (512 sq. ft.)

A combined chemical storage and preparation room is located between the two biology labs. We are in the process oconsolidating the two biology prep labs to make this lab more of a research space. A large free-standing autoclave is located here. About a third of the room is separated by a door and is designed to be used for student research projects. In this projects room, there is a Bio-Rad Gel Doc EZ Imager, inverted microscope, centrifuge, NanoDrop Lite Spectrophomter, and a Bio-Rad CFX Opus 96 Real-Time PCR System.

Non-Majors Biology Laboratory Room 106 (1215 sq. ft.)

This room is primarily used for laboratory sections of non-majors biology (BIOL 101 and 103). This is usually 6-7 three hour sections.

Greenhouse 108 (468 sq. ft.)

A heated greenhouse is attached to the building next to Room 106. Plants for demonstration are grown here and many courses grow plants for experiments such as a plant competition study in ecology.

General Biology Laboratory Room 109 (1575 sq. ft.)

General Biology and many upper division biology courses including anatomy, physiology, ecology, and vertebrate biology are taught in this spacious room. Not only laboratory sections, but lecture sessions are conducted in this space. This allows a blending of lab and class activities. Most of the anatomy materials and organismal diversity collections are housed here.

Preparation and Storage 111/112 (712 sq. ft.)

This room is set up primarily for the preparation of general biology labs. Also, it is utilized as a storage area for material overflow and reference books, as well as a media, reagent, and sample preparation. Dr. Deccechi uses a portion of Room 112 for his research. There is a door to the outside that facilitates sample transportation. Room 111 has a large laboratory refrigerator and two freezers. Room 112 has a laboratory fume hood and dishwasher along with shelving for equipment storage.

Advanced Chemistry Lab 139 (1110 sq. ft.)

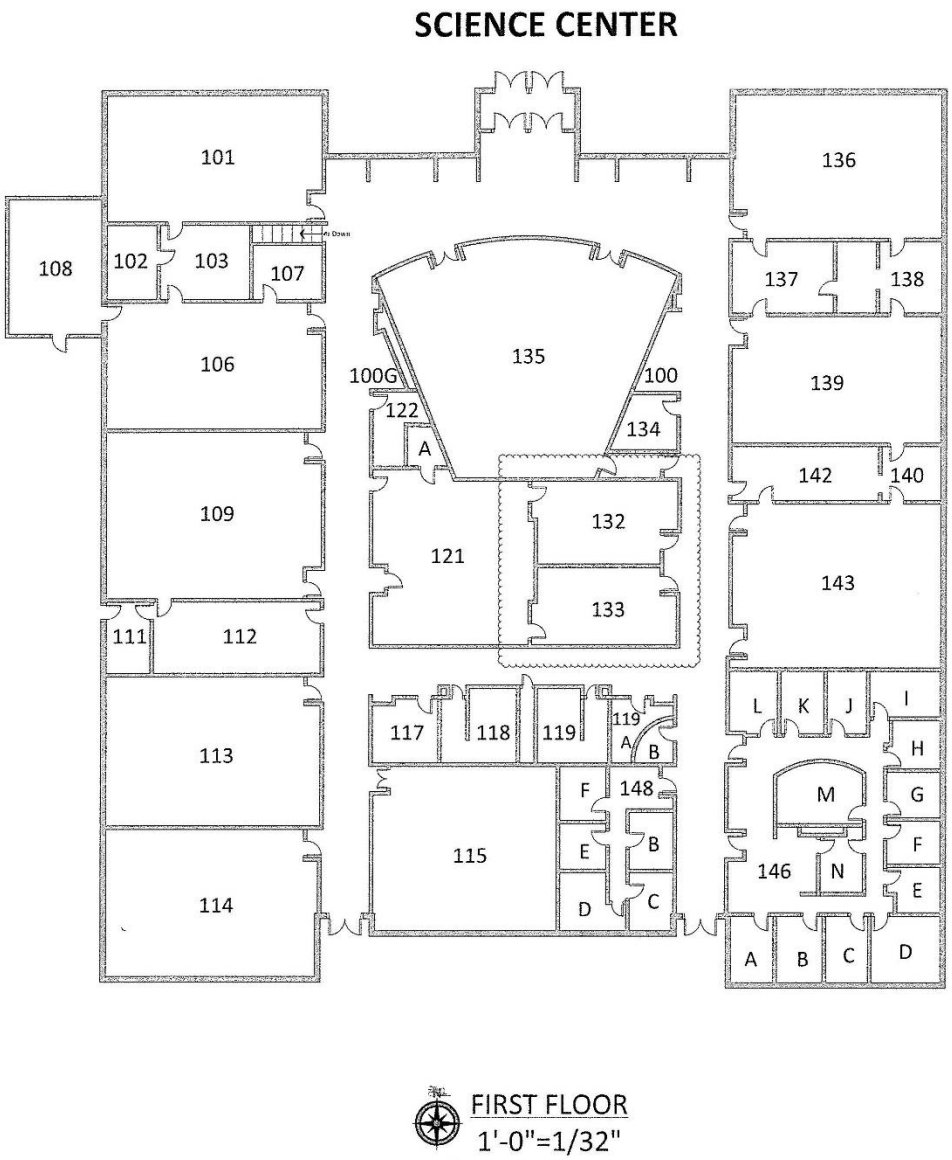
Upper division courses such as organic chemistry, analytical chemistry, and biochemistry are taught in the this specialized lab. In collaboration with chemistry professor Dr. Jeffery Elbert, many biology students will use this room for research projects. Large amounts of open counter space can be used for almost any specialized experimental apparatus and large fume hoods line one of the walls. Storage area and bench space is available for individual student research projects. Analytical balances, an ice machine, a laminar flow hood, and other specialized equipment are located here. A room with a heavily used GC/MS opens off the rear of this laboratory.

Conference Rooms 132 and 133

These two rooms are designed to be used for a variety of purposes. Faculty, staff and student groups schedule meetings here, and specialized courses such as seminars and discussion groups often are conducted in these rooms.

Auditorium SC 135

Larger courses such as introductory biology, chemistry, physics are taught here as well as anatomy and several courses from other disciplines in the College of Arts and Sciences. Tables in front of the more than one hundred seats facilitate computer use along with an abundance of electrical outlets. Students enjoy the comfortable seating and excellent sight lines provided by the gently sloping floor. A multimedia projector gives a large, high resolution image, and the theater surround sound system and specialized design features provide an excellent acoustic environment.



Quality of the Facilities

After the 2010 remodeling project, the facilities are very good.

Additional Facilities Needed

With increasing faculty and undergraduate research, more spaces dedicated to those efforts are essential. Students currently work on their research projects at night or between classes in the laboratories, which are not solely dedicated to research. In order to conduct high quality research, the faculty and students need dedicated research space, which is currently unavailable in the Science Center.

During the summer, Dr. Sathoff uses the Advanced Biology Lab (room 101) as his research laboratory space. Since is unlikely to be remodeled within the next 10 years,

we're currently investigating if bench space in the Advanced Chemistry Lab or the Prep Lab in room 103 can be used for biology student and faculty projects.

Quality of Current Equipment

Most of the current equipment is in good condition and works reasonably well, but maintenance and eventual replacement of some of the more expensive instruments is a concern.

Capital Equipment

Computer equipment for classroom and lab:

Computer interfaces, software, and data probes (Vernier)

Projectors mounted in all biology classrooms and laboratories

Projection capable compound and dissecting microscopes

Compound and dissecting microscopes with digital cameras

Available for Faculty Use:

Networked laser printer/copier/scanner located in the Science Center office complex.

Biology Laboratory Equipment

See list in Appendix D.

Quality of Current Equipment

The strategic plan to purchase more equipment after the remodeling of the building has significantly increased the quality and quantity of more modern equipment in the teaching laboratories. Much of the equipment is in reasonable condition, but increased use has also led to a problem in keeping all items in good working condition. There have been several expensive repairs and service visits required in the last few years. The biology program has asked for university line-item funding to provide for service contracts and ongoing maintenance of major equipment. The increasing demands of keeping equipment serviceable cannot be adequately and ethically funded through utilizing student lab fees.

<u>Service Contracts and Maintenance:</u>		
GCMS Service contract	$	3,796
Autoclave Servicing	$	1,231
Microscope Servicing	$	800
Laminar Flow and Flume Hoods	$	360
Oven and Incubator Calibration	$	538
Pipette (~40) Calibration	$	1,480

Balances	$	908
Janitorial Maintenance	$	2,240
Total	$	11,353

Additional Equipment Needed

It would be difficult to obtain all the equipment that could be used, but some equipment needs to be purchased to further the research programs of faculty and the computer-integration mission of the university.

Equipment for Research Initiatives:

FTIR and Raman Spectroscopy Equipment	$12,000
Fluorescence Microscope	$35,000
HPLC Equipment	$25,000
Total	$72,000

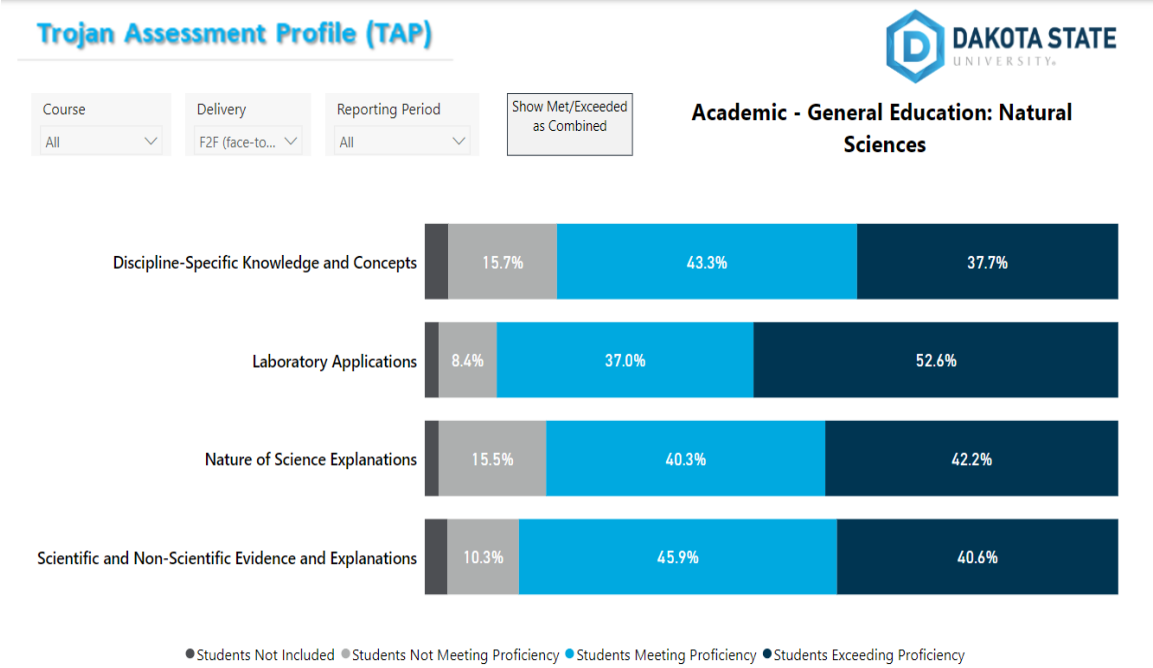
Part 8 Assessment and Strategic Plans

The Biology Program monitors students' academic progress in a variety of ways:

- Through General Education assessment. General Education courses have an assessment plan, and faculty report results each semester in the Trojan Assessment Profile. Biology faculty regularly review these data, and the university Academic Assessment Committee reviews results to see if any changes are warranted.
- Through student proficiency in biology program learning outcomes (PLOs).
- During the semester in which they graduate (major-field assessment).

General Education Assessment

Each semester faculty assess students in their Natural Sciences General Education (GE) courses for proficiency in the four GE student outcomes. Data are collected and stored on the Trojan Assessment Profile. Below is a graph generated using the assessment data from Spring 2021 to Fall 2023.



Biology Program Learning Outcomes (PLOs)*

*In Fall 2023, the biology program started to develop new PLOs due to turnover in staff and changes in curriculum. These PLOs were used until the end of the 23/24 academic year.

Goal 1. Graduates will have a basic knowledge of the principles of biology.

a. Graduates will understand the important concepts and methods of the major disciplines within biology.

b. Graduates will have a basic knowledge of the history and philosophy of science and will understand the ethical and humanistic implications of the practice of science including issues in biology that are controversial in nature.

Goal 2. Students will be able to use their knowledge of concepts in biology to solve new problems.

a. Students will understand the process of science including the basic steps of the scientific method and use this ability to conduct research in biology.

b. Graduates will think logically and be experienced problem solvers.

Goal 3. Have a high degree of proficiency in the use of computer technology.

a. Students will be proficient users of computer technology to find information, acquire and analyze data, and communicate results and conclusions.

b. Graduates will be able to successfully use technology in their post-graduate career:

Goal 4. Students will be able to communicate their knowledge and results effectively for a wide range of purposes and intended audiences.

a. Graduates can effectively communicate information in writing.

b. Graduates are effective speakers communicating information to a variety of audiences.

Assessment of the Goals and Objectives of the Biology Program

Assessment of program quality and student outcomes is an important component of program enhancement in the Biology Program at Dakota State University. The biology faculty is developing a new plan with several assessment activities for each major that are assessed by multiple criteria. The common set of assessment measures previously used include course grades, national exams, graduate surveys, employer surveys and exit interviews.

In 23-24, the biology faculty engaged in a discussion of new Program Learning Outcomes (PLOs), curriculum mapping, and new assessment processes. The new PLOs have almost been finalized and are going through a final round of revision.

- Each Program Learning Outcome will be mapped to courses in which they were introduced, developed, and mastered. The previously used map is located in Appendix E.
- Prepare appropriate assessment activities that will provide direct measures of student achievement of learning outcomes. Establish a schedule to monitor each of these outcomes in those courses corresponding to mastery of the outcomes.
- Collect data for 3 semesters to see if results indicate any cause for concern. Faculty will continue to annually review assessment data and recommend changes for improvement, if necessary.

We are still in the early stages of revising the assessment plans, but we hope that the changes will provide better evidence of where successes are occurring and also where improvement is needed.

Major Field Exit Exam (MFAT) for Program Assessment

Students who apply to graduate are required to complete an exit exam in their field of study. Students complete the exam in the semester they plan to graduate (summer graduates participate in the assessment activity in the spring semester). DSU administers the biology exam developed by Educational Testing Service (ETS) to students graduating

to assess the effectiveness of the biology program. More about the exam content, validity, and comparative data can be found at: https://www.ets.org/mft/about/test-content.html#accordion-635e2f095b-item-d6a0e7ac75

DSU students' average score has remained within one standard deviation of the national user norm. Additionally, the majority of the DSU students score at or above the 50th percentile when compared to the user norms. Since Fall 2017 (we did not test in 2020 due to COVID-19), 30 students have completed the Major Field Assessment Exam in Biology and only seven have scored lower than 1 standard deviation of the User Norms – in some cases this may even have been due to a lack of effort as there are no consequences to scoring low on this assessment. During the same time, five students scored above 1 standard deviation of the User Norms.

Strategic Planning

Strategic Plan of Dakota State University

Dakota State University is a public, mission-driven institution. It is South Dakota's designated information technology university and is a leader in integrating this technology into the academic disciplines of its curriculum. Academic rigor and the infusion of information technology into teaching, research, and creative activity are at the heart of the university's work.

A strategic plan ADVANCE 2022-2027 was recently developed:

Dakota State University's ADVANCE strategic plan began in 2022 and will continue to evolve through 2027 and beyond. Below are selected institutional strategic plan goals (from the larger plan) relevant to the biology program:

Pillar 1: Increase student success.

- Goal: Meet or exceed national norms and internal benchmarks for student academic success.
    - Benchmarks:
        - By 2027 the 4-year overall graduation rate for 1st-time, full-time degree-seeking graduates is 40%.
        - By 2027 the 6-year overall graduation rate for 1st-time, full-time degree-seeking graduates is 60%.
    - By 2027 the overall retention rate from fall to fall for 1st-time, full-time freshmen degree-seeking graduates is 80%.
    - By 2027 the overall employment rate for 1st-time, full-time degree-seeking undergraduates accounted for is 100%.

Pillar 2: Improve Engagement, Governance, & Communication

- Goal: Increase employees' sense of engagement with the university.
    - Benchmark:

        - By June 30th, 2027, the Gallup Index shows that 50% of DSU employees are engaged (feel involved in and enthusiastic about their work and workplace; they are loyal and productive).

Pillar 3: Grow Scholarship, Research, Intellectual Property, & Economic Development

- Goal: Increase the productivity of research and scholarly activities.
    - Benchmarks:
        - By June 2027, DSU has had 10 or more collaborative research partners in the last five years.
        - By June 2027, sponsored research has $12,000,000 in annual expenditures.
        - By June 2027, Research and Economic Development has generated 10 new research jobs since 2022.
        - From 2022-2027, faculty participating in sponsored programming for the first time increased by 50%.
        - From 2022-2027, the number of staff participating in sponsored programming increases by 25%.
        - From 2022-2027, the number of students participating in sponsored programming increases by 25%.

Pillar 4: Elevate Athletics

- Goal: Elevate the importance of academic success of student athletes through the delivery of student academic supports.
    - Benchmark:
        - By fall 2027, the DSU athlete average GPA is 3.0.

Pillar 5: Increase Sustainability & Resilience

- Goal: Increase university enrollment through program development, targeted recruitment, admission, and marketing campaigns.
    - Benchmark:
        - DSU enrollment will exceed 3,700 total students.

Appendix A – Biology Degree (23-24 Catalog Description)

A Bachelor of Science in Biology prepares graduates to become employees for the science-based industries, medical fields, and agencies that use modern technology or to teach Biology and a selected minor at the secondary level. Students in this major must choose from Integrative Biology Specialization or Biology Education Specialization.

The Integrative Biology Specialization provides an excellent background in computer science/information systems technology as well as a solid foundation in biology, supporting sciences, and mathematics. The graduates of this program will be capable of problem solving and developing marketing strategies for products of research and service in the science-based information industries, such as the biotechnology industry where a background in science and technology, is increasingly necessary. This program also provides an excellent foundation for persons wishing to pursue a specialized professional career such as medicine, dentistry, etc. or to obtain advanced education in the health fields or biological science. DSU has an articulation agreement with SDSU for students who have completed a bachelor's degree in Biology who wish to apply to the accelerated nursing program at SDSU and obtain a Bachelor of Science in Nursing (BSN) degree.

The Biology Education Specialization follows the guidelines of the National Science Teachers Association that a biology core and supporting science, computer and Mathematics courses. Students in this major will have an education technology endorsement.

Location(s): Madison Main Campus

Learning Outcomes: Biology Education
Learning Outcomes: Integrated Biology

Plan of Study - Biology, Education 23-24
Plan of Study - Biology, Integrated Biology 23-24

System-wide General Education Requirement (30 Credits)

Majors must take BIOL 151/151L and BIOL 153/153L as part of the System-wide General Education Requirement. Students choosing the Biology Education Specialization must take EPSY 210 and INED 211 as part of the System-wide General Education Requirement.

Biology Core (21 Credits)

- BIOL 145 - Introduction to Scientific Inquiry 1 credit
- BIOL 221 - Human Anatomy 4 credits
- BIOL 221L - Human Anatomy Lab 0 credits
- BIOL 280 - Inquiry and Analysis in Biology 1 credit
- BIOL 280L - Inquiry and Analysis of Biology Laboratory 1 credit
- BIOL 311 - Principles of Ecology 4 credits
- BIOL 311L - Principles of Ecology Lab 0 credits
- BIOL 331 - Microbiology 4 credits
- BIOL 331L - Microbiology Lab 0 credits
- BIOL 371 - Genetics 4 credits
- BIOL 371L - Genetics Lab 0 credits
- BIOL 498 - Undergraduate Research/Scholarship 1-12 credits (2 credits required)

Choose one of the following Specializations (59 Credits)

Integrative Biology Specialization (59 credits)

Biology Component (19 credits)

- BIOL 343 - Cell and Molecular Biology 4 credits
- BIOL 343L - Cell and Molecular Biology Lab 0 credits
-
- **Choose 15 credits from the following:**
- BIOL 201 - General Botany 3 credits
- BIOL 201L - General Botany Lab 0 credits
- BIOL 235 - Introduction to Biotechnology 3 credits
- BIOL 235L - Introduction to Biotechnology Lab 0 credits
- BIOL 325 - Physiology 4 credits
- BIOL 325L - Physiology Lab 0 credits
- BIOL 365 - Vertebrate Zoology 4 credits
- BIOL 365L - Vertebrate Zoology Lab 0 credits
- BIOL 410 - Conservation Biology 3 credits
- BIOL 422 - Immunology 3-4 credits (4 credits required)

- BIOL 422L - Immunology Lab 0-1 credits (0 credits required)
- BIOL 492 - Topics 1-4 credits *
- *May be repeated provided student does not enroll in the same topic course.

Math and Science Component (22 credits)

Students planning to pursue a career in medicine or health professions are encouraged to take CHEM 326, CHEM 460, CHEM 492, MATH 123 or MATH 201, PHYS 111 or PHYS 211 and PHYS 113 or PHYS 213.

- CHEM 112 - General Chemistry I 4 credits
- CHEM 112L - General Chemistry I Lab 0 credits
- CHEM 114 - General Chemistry II 4 credits
- CHEM 114L - General Chemistry II Lab 0 credits
- MATH 281 - Introduction to Statistics 3 credits
-
- **Choose 11 credits from the following:**
- CHEM 326 - Organic Chemistry I 3 credits
- CHEM 326L - Organic Chemistry I Lab 1 credit
- CHEM 328 - Organic Chemistry II 3 credits
- CHEM 328L - Organic Chemistry II Lab 1 credit
- CHEM 332 - Analytical Chemistry 3 credits
- CHEM 332L - Analytical Chemistry Lab 1 credit
- CHEM 460 - Biochemistry 3 credits
- CHEM 492 - Topics 1-4 credits
- EXS 350 - Exercise Physiology 3 credits
- EXS 350L - Exercise Physiology Lab 1 credit
- EXS 353 - Kinesiology 2-3 credits
- HIM 130 - Basic Medical Terminology 2 credits
- HLTH 422 - Nutrition 3 credits
- MATH 123 - Calculus I 4 credits
- MATH 125 - Calculus II 4-5 credits (4 credits required)
- MATH 418 - Mathematical Modeling 3 credits
- PHYS 111 - Introduction to Physics I 3 credits
- PHYS 111L - Introduction to Physics I Laboratory 1 credit
- PHYS 113 - Introduction to Physics II 3 credits
- PHYS 113L - Introduction to Physics II Laboratory 1 credit
- PHYS 211 - University Physics I 3-4 credits (4 credits required)
- PHYS 211L - University Physics I Laboratory 0-1 credits (0 credits required)
- PHYS 213 - University Physics II 3-4 credits (4 credits required)
- PHYS 213L - University Physics II Laboratory 1 credit (0 credits required)

Science Technology Component (15 credits)

- BIOL 303 - Introduction to Biological Instrumentation 3 credits
- BIOL 335 - Introduction to Bioinformatics 3 credits
- CSC 105 - Introduction to Computers 3 credits
- ENGL 379 - Technical Communication 3 credits
- **Choose one course from the following (3 credits)**
- CIS 123 - Problem Solving and Programming 3 credits
- CIS 130 - Visual Basic Programming 3 credits
- CSC 150 - Computer Science I 3 credits

Social Science Component (3 credits)

Select a course from Social Science listing with prefix ANTH, HIST or SOC that is not already used to satisfy general education requirement.

Biology Education Specialization (59 Credits)

Biology Education Component (11 credits)

- BIOL 325 - Physiology 4 credits
- BIOL 325L - Physiology Lab 0 credits
-
- **Select 7 credits from the following:**
- BIOL 201 - General Botany 3 credits
- BIOL 201L - General Botany Lab 0 credits
- BIOL 235 - Introduction to Biotechnology 3 credits
- BIOL 235L - Introduction to Biotechnology Lab 0 credits
- BIOL 335 - Introduction to Bioinformatics 3 credits
- BIOL 343 - Cell and Molecular Biology 4 credits
- BIOL 343L - Cell and Molecular Biology Lab 0 credits
- BIOL 365 - Vertebrate Zoology 4 credits
- BIOL 365L - Vertebrate Zoology Lab 0 credits
- BIOL 410 - Conservation Biology 3 credits
- BIOL 422 - Immunology 3-4 credits (4 credits required)
- BIOL 422L - Immunology Lab 0-1 credits (0 credits required)
- BIOL 492 - Topics 1-4 credits *
- *May be repeated provided student does not enroll in same topics course.

Chemistry Component 8 credits

- CHEM 112 - General Chemistry I 4 credits
- CHEM 112L - General Chemistry I Lab 0 credits
- CHEM 114 - General Chemistry II 4 credits
- CHEM 114L - General Chemistry II Lab 0 credits

Computer Technology Component 12 credits

- BIOL 303 - Introduction to Biological Instrumentation 3 credits
- CSC 161 - Computer Hardware, Data Communications and Networking 3 credits
- CSC 105 - Introduction to Computers 3 credits
- **Choose one course from the following 3 credits**
- CIS 123 - Problem Solving and Programming 3 credits
- CIS 130 - Visual Basic Programming 3 credits
- CSC 150 - Computer Science I 3 credits

Professional Education Component 28 credits

All Professional Education courses must be completed with a grade of "C" or better. [1] No Grade less than a "C" and must be completed prior to admission to Teacher Education.

- EDFN 338 - Foundations of American Education 1-2 credits (2 credits required) [1]
- EPSY 302 - Educational Psychology 2-3 credits (3 credits required) [1]
- SEED 295 - Practicum 1 credit
- SPED 100 - Introduction to Persons with Exceptionalities 3 credits [1]
- Note: Admission to the Teacher Education Program is required for the remaining courses. See Requirements for Admission to the College of Education.
- EDFN 475 - Human Relations 3 credits
- SEED 302 - Secondary/Middle Content Area: Major 2-3 credits (2 credits required)
- SEED 401 - Methods of Educational Technology 1 credit
- SEED 440 - Classroom Management 1-3 credits (2 credits required)
- SEED 450 - Reading and Content Literacy 1-3 credits (3 credits required)
- SEED 488 - 7-12 Student Teaching 2-16 credits (8 credits required)

Electives (10 Credits)

Two of these electives will have been met upon completion of BIOL 151/151L and BIOL 153/153L as part of the System-wide General Education Requirement.

Appendix B: Undergraduate research projects 2018-2023.

Under the direction of Kristel Bakker:
2017-18:

*Jackie Krakow, "Grassland Bird Use of Low and High Diversity Native Plantings".

2018-19:

*Landon Ahlers, "An Evaluation of High and Low Diversity Grassland Plantings in Eastern South Dakota with Respect to the Invasiveness of *Cirsium arvense* (Canada Thistle)".

*Brandon Berndt, "An Evaluation of High and Low Diversity Grassland Plantings in Eastern South Dakota with Respect to the Invasiveness of *Bromus inermus* (Smooth Brome)".

*Paul Taggart, "Ring-necked Pheasant Use of Low and High Diversity Native Plantings".

*Trever Listman, "Assessment of Wax Worms as an Alternative Host to Study the Virulence of the Coral Pathogen *Vibrio coralliilyticus*". Co-advisor with P. Videau.

*Abbey Young, "Coexistence of Great Horned and Eastern Screech Owls in Woodlands of Varying Sizes".

2019-2020:

*Assisted Sandra Champion and her undergraduate student, Ryan Little, on an interdisciplinary project exploring acoustic ecology.

*Taylor Sinner, "The Effect of Caffeine on Blood Pressure".

*Jobi McCreary, "The Effect of Different Muscle Warm Up Methods on Amount of Maximum Weight Lifted".

*Jacob Geary, "Evaluation of Snow Depth and Wildlife Habitat in High and Low Plant Diversity Areas".

*Brian Pierson, "Coexistence of Great Horned and Eastern Screech Owls in Coniferous and Deciduous Woodlands".

2020-2021:

*Kevin Krumm, "Pheasant Use of Low and High Diversity Grassland Plantings during the Spring".

2021-2022:

*Makayla Welbig, “Surveying for Bird Strikes on Windows with and without Reflective Decals”.

*Elsie Aslesen, “A Pilot Study to Determine if Neonicotinoids Accumulate in the Eggshells of Birds in the Wild”.

*Kahlil Tilbury, “Fox Squirrel Occurrence and Density in Urban and Rural Habitats”.

2022-2023:

*Abigail Grabowska, “Effect of Wearing a Facial Mask on Blood Pressure During Exercise”.

*Christine Vogel, “Detecting Bias Among Personal Outcome Interviewers”.

*Elsie Aslesen, “Neonicotinoid accumulation in Eggshells of Birds in the Wild”.

*Xzyana Henderson, Writing and presenting summer internship research results.

*Jada Anderson, “Comparison of Fruit and Vegetable Compost on Plant Growth”.

2023-2024:

*Carter Malone, “Effect of Using Lecture Guides on Quiz Scores in Biology”.

*Lucas Wieczorek, “Effect of Temperature and Progress of Harvest on Crop Contents of Ring-necked Pheasants in the Fall”.

*Oleksandra Rachynska, “Comparison of the Chemical and Molecular Composition of Berries from Introduced vs. Native Woody Species Available During Fall Bird Migration”. Co-Mentor with J. Elbert.

Under the direction of Andrew Sathoff:

Summer 2020:

*Jenni Giles and Conner Tordsen, “Aphanomyces Root Rot Disease Survey in Eastern South Dakota”.

2020-2021:

*Jenni Giles, “Isolation and Characterization of *Pythium* spp. from South Dakota Soils Under Commercial Alfalfa Production”.

*Conner Tordsen, “Pathogenicity and Fungicide Sensitivity of South Dakota Field Isolates of *Aphanomyces euteiches*”.

Summer 2021:

*Jenni Giles, Conner Tordsen, and Travis Rebstock, “Identification and Characterization of Pythium Species Isolated from Commercial Alfalfa Fields in South Dakota”

2021-2022:

*Jenni Giles, “Fulfilling Koch’s Postulates: Determining the Pathogenicity of *Pythium* Species Isolated from South Dakota Soils”.

*Conner Tordsen, “Assessing Commercial Biological Control Agents for Activity Against South Dakota Field Isolates of *Aphanomyces euteiches*”.

*Aubrey Lipetzky, “Developing Inquiry-based Online Laboratories for Undergraduate Botany”.

*Brooklyn Goosen, “Creating Publication Quality Animations for *Aphanomyces euteiches*”.

Summer 2022:

*Brandon Daniels, Travis Rebstock, and Oleksandra Rachynska, “Assessing Commercial Biological Control Agents for Activity Against Alfalfa Root Rotting Pathogens”.

“Quantitative Real-Time PCR Identification of Soybean Pathogens in Eastern South Dakota Soil”.

2022-2023:

*Jay Tedone, “Functional Analysis of Differentially Expressed Genes in Alfalfa (*Medicago sativa*) Inoculated with *Aphanomyces euteiches*”.

*Travis Rebstock, “Assessing South Dakota *Fusarium* Isolates for Pathogenicity Towards Alfalfa”.

*Adam Peak, “Literature Review of Snake Fungal Disease”.

*Oleksandra Rachynska, “Developing an Alfalfa Pathology Case Study for Use in Undergraduate Biology Courses”.

*Cage Boschee, “Does Protein Content in Oyster Mushrooms Change Depending on Substrate?”.

2023-2024:

*Adam Peak, “Surveying for *Ophidiomyces ophidiicola*, the Causal Agent of Snake fungal Disease in South Dakota”.

*Denyce Bravo, “Exploring Antimicrobial Potential of Honey from Alfalfa (*Medicago sativa*) Against both Human and Alfalfa Pathogens”.

*Jonah Worden, “Identifying Rust on DSU Campus Hawthorne Trees”.

*Braxton Lacher, “Uncovering Phage-based Treatments for Bacterial Diseases of Alfalfa”.

Under the direction of Dale Droge (retired after Spring 2022 semester):

2018-2019:

*Hope Juntunen, “Investigating the Kinetics of Clay-catalyzed Conversion of Anthracene to Prebiotically Relevant 9,10-anthraquinone”.

*Vaille Swenson, “Assessment and Verification of Commercially Available Pressure Cookers for Laboratory Sterilization”.

*Jared Richardson, “Sampling and Analysis of Phosphorus in Snow Run-off”.

*Thomas Punt, “Testing Effect of Cover Vegetation on Nitrate Concentration in Water Run-off”.

2019-2020:

*Connor Teel, “Does Phosphorus Fertilizer Contribute Significantly to Bluegrass (*Poa annua*) Growth in Typical Soils of Eastern South Dakota?”

2020-2021:

*Riley Janke, “The Effect of Y-Drop Fertilizer Application on Corn Yields”.

2021-2022

*Juliette Rios, “Utilizing Phosphorus-Free Fertilizer and Prevent the Growth of Algae Blooms in Lake Madison, South Dakota”.

*Austin Donat, “Surveying Water Pump Windmills for Prey Choice by Birds of Prey via Prey Remains”.

*Ashlyn MacDonald, “The Effects of E-cigarette (Vaping) Use on University Athletes”.

Under the direction of Michael Gaylor (left DSU during Spring 2022):

Dr. Michael Gaylor was a very productive researcher, who helped shift the undergraduate research culture at DSU. Even though he served as DSU's chemist, numerous biology students completed projects in his lab. Based on work done in Dr. Gaylor's lab, Hope Juntunen and Vaille Swenson (biology majors) were selected for prestigious Goldwater Scholarships in 2017 and 2018, respectively. In Spring 2022, Dr. Gaylor suddenly left DSU in the middle of the semester for an industry position. Subsequently, he has had little contact with the university, and we are unable to obtain records of student projects under his mentorship during this review period.

Appendix C: Integrative Biology Advising Check Sheet (23-24)

DAKOTA STATE UNIVERSITY

Plan of Study

Biology
with Integrative
Biology Specialization

Catalog Year: 2023-2024

Sample Schedule: students are not limited to this plan; it is meant to serve as a guide for planning purposes in discussions with your academic advisor. This plan is one possible path to completing this degree in ***four years.***

FIRST YEAR

First Semester

Course *Biology Core (21 credits)	Prerequisites / Comments	Credits	Semester(s) Offered
*BIOL 145 Introduction to Science Inquiry		1	F
BIOL 151 General Biology I & Lab		4	F
MATH 114 College Algebra	Placement reports determine	3	F/S/SU
Social Science Requirement		3	F/S/SU
CSC 105 Introduction to Computers		3	F/S/SU
	Total Credit Hours	14	

Second Semester

Course	Prerequisites / Comments	Credits	Semester(s) Offered
BIOL 153 General Biology II & Lab		4	S
ENGL 101 Composition I		3	F/S/SU
Arts & Humanities Requirement		3	F/S/SU
Oral Communication Requirement		3	F/S/SU
CSC 123 or CSC 150 or CIS 130 elective		3	F/S/SU
	Total Credit Hours	16	

SECOND YEAR

Third Semester

Course	Prerequisites / Comments	Credits	Semester(s) Offered
*BIOL 331 Microbiology & Lab	BIOL 151	4	F
*BIOL 280 Inquiry and Analysis in Biology & Lab	BIOL 151 or BIOL 153	2	F
CHEM 112 General Chemistry I & Lab	Math 114, 115, 129, 121, 123, 125 or 281	4	F
Math/Science elective (1)		4	
Social Science Requirement		3	F/S/SU
	Total Credit Hours	17	

Fourth Semester

Course	Prerequisites / Comments	Credits	Semester(s) Offered
*BIOL 221 Human Anatomy & Lab	BIOL 151	4	S
CHEM 114 General Chemistry II & Lab	CHEM 112 and Math 114, 115, 129, 121, 123, 125 or 281	4	S
Elective		3	
ENGL 201 Composition II	ENGL 101	3	F/S/SU
	Total Credit Hours	14	

THIRD YEAR

Fifth Semester

Course	Prerequisites / Comments	Credits	Semester(s) Offered
*BIOL 311 Principles of Ecology & Lab	BIOL 151	4	F odd years
BIOL 325 Physiology & Lab Elective	BIOL 221 or BIOL 323	4	F
Math/Science elective (2)		4	
MATH 281 Statistics		3	F/S/SU
	Total Credit Hours	15	

Sixth Semester

Course	Prerequisites / Comments	Credits	Semester(s) Offered
*BIOL 371 Genetics & Lab	BIOL 151	4	S
BIOL 335 Bioinformatics	BIOL 151 and Lab; and CSC 105	3	S
Math/Science elective (3)		4	
Arts & Humanities Requirement		3	
	Total Credit Hours	14	

FOURTH YEAR

Seventh Semester

Course	Prerequisites / Comments	Credits	Semester(s) Offered
BIOL elective		3	
BIOL elective		4	
Elective		4	
Social Science Requirement		3	
	Total Credit Hours	14	

Eighth Semester

Course	Prerequisites / Comments	Credits	Semester(s) Offered
BIOL 343 Cell Molecular Biology	BIOL 151	4	S
BIOL elective		4	
*BIOL 498 Undergraduate Research	Consent of the instructor	2	F/S
BIOL 303 Intro.-Biological Instrumentation	BIOL 151 and Lab	3	S
ENGL 379 Tech Communications	ENGL 201	3	S
	Total Credit Hours	16	

Semester: F = Fall; S = Spring; SU = Summer; ***Information and course schedules may change. This is not a contract.***

Appendix D: Biology Lab Equipment

Item	Quantity
Microscope, binocular, w/ digital camera	9
Microscopes, Reichert binocular	18
Microscopes, American optical monocular	28
Microscopes, binocular dissecting	15
Microscope, dissecting w/ digital camera	1
Microscope, inverted	1
Centrifuge, benchtop	2
Centrifuge, tabletop	1
Shaking Incubator	1
Incubators, 20-75 C	4
Ultra Low Freezer (-80 C)	1
Plant Growth Chambers	2
Autoclave, Primus	1
pH meter, Sargent Welch digital	1
Electrophoresis rigs (polyacrylamide and agarose)	10
Thermocycler	2
Spectrophotometer	1
Bio-Rad Gel Doc EZ Imager	1
NanoDrop Lite (UV-Vis microvolume spectrophotometer)	1
Bio-Rad CFX Opus 96 Real-Time PCR System	1
Agilent/BioTek Synergy H1 Microplate Reader	1
Oven, gravity, convection	1
Freezers (-20 C)	2
Chest freezer (-20 C)	1
Laboratory refrigerator	3
Water bath, thermostatic	3
Balance top loading	6
Hood, laminar flow	2
Vortex mixers	8
Benchtop MilliQ water system	1

Equipment in Chemistry Lab Frequently Used by Biology:

Item	Quantity
Analytical Balance with 0.0001 g accuracy	4

GC-MS (electron impact only)	1
Supercritical fluid extractors	2
Research quality dissecting microscope	1
Ice Machine	1

Appendix E: Program Assessment Plan

I = Concepts and skills for the outcome **introduced**.
R = Concepts and skills for the outcome **reinforced**.
M = Concepts and skills for the outcome **mastered**.

Biology students will:	Gen Biol I	Gen Biol II	General Botany	Environmental Biology	Intro. to Biotechnology	Human Anatomy	Ecology	Physiology	Microbiology	Cell and Molecular	Genetics	Vertebrate Biology	Conservation Biology	Immunology	Bioinformatics	Undergrad Research
Goal 1. Have a basic knowledge of the principles of biology. a. Important concepts and methods of the major disciplines within biology.	I	I	I	I	I		R	R	R	R	R	R	R	R		M
b. History and philosophy of science	I		R						R		M					M
c. Ethical and humanistic implications of the practice of science including issues in biology that are controversial in nature.	I			I	R		R				R	R	R	R		
Goal 2. Use their knowledge of concepts in biology to solve problems. a. Understand the process of science including the basic steps of the scientific method and use this ability to conduct research in biology.	I	I		I	R		R				R					M
Goal 3. will be proficient users of computer technology to find information, acquire and analyze data, and communicate results and conclusions.	I	I	I		I		R	R		M	R				M	M
Goal 4. Students will be able to communicate their knowledge and results effectively orally and in writing	I	I		I		I			R	R	R	R	R			M

Appendix F: Faculty CVs

CURRICULUM VITAE

Andrew E. Sathoff

Dakota State University
College of Arts and Sciences
820 N Washington Ave.
Madison, SD 57042
Phone: (605) 291-5455
Email: andrew.sathoff@dsu.edu

EDUCATION

Ph.D. Plant Pathology, University of Minnesota, St. Paul, Minnesota (2019)
Emphasis in Molecular Biology
Thesis Advisor: Deborah Samac

B.A. Biology, with honors, St. Olaf College, Northfield, Minnesota (2013)
Minor in Biomedical Studies

TEACHING EXPERIENCE

Assistant Professor of Biology, College of Arts and Sciences (2019-Present)
Dakota State University, Madison, SD
Tenure-track position teaching a variety of biology courses during the academic year and researching during the summer

Adjunct Instructor, Biology Department (2018)
Metropolitan State University, St. Paul, MN
Instructor of record for General Biology I for two semesters (Spring-Fall 2018)

Visiting Professor, Department of English (2013-14)
East China Normal University, Shanghai, China
Instructor of record for Conversational English for two semesters teaching four graduate level courses each semester.

PUBLICATIONS

Giles, J.M.*, Tordsen, C.L.*, Rebstock, T.R.*, Bucciarelli, B., Samac, D.A., and **Sathoff, A.E.** 2022. Management strategies and distribution of Aphanomyces root rot of alfalfa (*Medicago sativa*), a continuing threat to forage production in the United States. *Plant Pathology*.

Tordsen, C.L.*, Giles, J.M.*, and **Sathoff, A.E.** 2022. First report of *Aphanomyces euteiches* race 1 and race 2 causing Aphanomyces root rot on alfalfa (*Medicago sativa*) in South Dakota. *Plant Disease* 106:771.

Sathoff, A.E., Dornbusch, M.R., Miller, S.S., and Samac, D.A. 2020. Functional analysis of *Medicago*-derived pathogen-induced gene promoters for usage in transgenic alfalfa. *Molecular Breeding* 40:60.

Sathoff, A.E., Lewenza, S., and Samac, D.A. 2020. Plant defensin antibacterial mode of action against *Pseudomonas* species. *BMC Microbiology* 20:173.

Sathoff, A.E. and Samac, D.A. 2019. Antibacterial activity of plant defensins. *Molecular Plant-Microbe Interactions* 32: 507-514.

Sathoff, A.E., Velivelli, S., Shah, D.M., and Samac, D.A. 2019. Plant defensin peptides have antifungal and antibacterial activity against human and plant pathogens. *Phytopathology* 109: 402-408.

Schmitt, A.J., **Sathoff, A.E.**, Holl, C., Bauer, B., Samac, D.A., and Carter, C.J. 2018. The major nectar protein of *Brassica rapa* is a non-specific lipid transfer protein with strong antifungal activity. *Journal of Experimental Botany* 69: 5587-5597.

Sathoff, A.E., Rajendran, D., Wannemuehler, S. D., Sweeney, K., Manan, F., Kosgey, Z. C., Garber, L. H., and Lockhart, B. E. 2016. First report of a 16SrI (aster yellows) group phytoplasma in phlox in the United States. *Plant Health Progress* 17: 198-199.

* = mentored undergraduate student

PRESENTATIONS

Alexander, J.*, Samac, D.A., **Sathoff, A.E.** Functional Analysis of Differentially Expressed Genes in Alfalfa (*Medicago sativa*) Inoculated with *Aphanomyces euteiches* race 1 and race 2. (Poster) Plant Health 2023, Denver, CO, 2023

Rebstock, T.R.*, Tordsen, C.L.*, Daniels, B. N.*, Rachynska, O.*, **Sathoff, A.E.** Assessing Commercial Biological Control Agents for Activity Against Alfalfa Root Rotting Pathogens. (Poster) World Alfalfa Congress, San Diego, CA, November, 2022

Sathoff, A.E. Uncovering and managing soilborne alfalfa diseases in South Dakota. South Dakota Academy of Science Annual Meeting (Invited Talk) Madison, SD, October, 2022

Rachynska, O.*, Rebstock, T.R.*, Tordsen, C.L.*, Giles, J.M.*, **Sathoff, A.E.** Identification and Characterization of Pythium Species Isolated from Commercial Alfalfa Fields in South Dakota. (Poster) Plant Health 2022, Pittsburgh, PA, August, 2022

Tordsen, C.L.*, **Sathoff, A.E.** Assessing Commercial Biological Control Agents for Activity Against South Dakota Alfalfa Pathogens (Invited Poster) 2022 South Dakota Student Research Poster Session, Pierre, SD, March, 2022

Sathoff, A.E. Alfalfa Root Rotting Diseases in South Dakota (Invited Talk) Mustang Seeds Dealer Days, Madison, SD, August, 2021

Giles, J.M*, Tordsen, C.L.*, **Sathoff, A.E.** Aphanomyces root rot of alfalfa disease survey in Eastern South Dakota establishes widespread pathogen distribution (Poster) Plant Health 2021, Online Meeting, August, 2021

Giles, J.M.*, **Sathoff, A.E.** Isolation and Characterization of *Pythium* spp. from South Dakota soils under commercial alfalfa production (Invited Poster) 2021 South Dakota Student Research Poster Session, Pierre, SD, March, 2021

Sathoff, A.E. Aphanomyces root rot of alfalfa in South Dakota. (Invited Talk) Mustang Seeds Dealer Days, Madison, SD, August, 2020

Sathoff, A.E., Lewenza, S., Samac, D.A. Plant defensin antibacterial mode of action against *Pseudomonas* species. (Poster) Plant Health 2020, Online Meeting, August, 2020

Sathoff, A.E. Transgenic expression of plant defensins and alfalfa disease management. (Talk) Microbial & Plant Genome Institute Annual Retreat, St. Paul, MN, January, 2019

Sathoff, A.E. Antimicrobial peptides and alfalfa disease control. (Talk) Industry-Extension Forage Advisory Council, La Crosse, WI, November, 2018

Sathoff, A.E. Plant Defensins: An Innovative Approach to Crop Improvement. (Talk) Hamline University Seminar Series, St. Paul, MN, September, 2018

Sathoff, A.E., S. Velivelli, D.M. Shah, D.A. Samac. Transgenic expression of a plant defensin in alfalfa (*Medicago sativa*) leads to increased resistance to crown rot pathogens. (Poster) International Congress of Plant Pathology, Boston, MA, July, 2018

Sathoff, A.E. A Transgenic Approach to Alfalfa Crown Rot Control. (Talk) North American Alfalfa Improvement Conference, Logan, UT, June, 2018

Sathoff, A.E., D.A. Samac, C. Holl, A. Schmitt, C. Carter. Antimicrobial Activity of *Brassica rapa* Nectar Lipid Transfer Protein. (Poster) Mycological Society of America Annual Meeting, Athens, GA, July, 2017

Sathoff, A.E., S. Velivelli, D.M. Shah, D.A. Samac. Antibacterial Activity of Plant Defensins Against Alfalfa Crown Rot Pathogens. (Talk) American Society for Microbiology Microbe Meeting, New Orleans, LA, June, 2017

Sathoff, A.E. Using Plant Defensins as a Novel Strategy to Control the Alfalfa Crown Rot Disease Complex. University of Minnesota Plant Pathology Seminar Series, St. Paul, MN, November, 2016

Sathoff, A.E., D.A. Samac. Plant defensins inhibit growth of pathogens in the alfalfa crown rot disease complex. (Poster) American Phytopathological Society Annual Meeting, Tampa, FL, August, 2016

Sathoff, A.E., D.A. Samac. Transgenic expression of Medicago truncatula PR10 and PR5 promoters in alfalfa shows pathogen induced up-regulation of transgene expression. (Poster) North American Alfalfa Improvement Conference, Madison, WI, July, 2016

Sathoff, A.E. *Erwinia rhapontici* and Crown Rot of Rhubarb. University of Minnesota Plant Pathology Seminar Series, St. Paul, MN, November, 2015

* = mentored undergraduate student

AWARDS, HONORS, AND GRANTS

True Trojan Award, Faculty Outstanding Contributor (2023)
-Student nominated, Awarded to the students' favorite teacher at Dakota State University

Merrill Hunter Award for Excellence in Research (2022)
-Awarded to Dakota State University's top researcher

Mustang Seeds Alfalfa Research Contract (2021)
-Received $20,000 in funding
Dakota State University Supporting Talent for Research Trajectories Grant (2020)
-Received $4,000 in funding
Mustang Seeds Alfalfa Research Contract (2020)
-Received $16,000 in funding
M.F. Kernkamp Fellowship (2018)
Torske Klubben Fellowship (2018)
-Leadership Fellowship ($16,000 stipend)
Fred I. Frosheiser Scholarship (2017)
Research Spotlight (https://plpa.cfans.umn.edu/harnessing-defensins) (2015)
Academic All-Conference: Minnesota Intercollegiate Athletic Conference (2011-2013)

RESEARCH EXPERIENCE

Mustangs Seeds Alfalfa Researcher (2020-Present)
Mustang Seeds, Madison, SD
Started long-term collaboration with Mustang Seeds studying alfalfa production in South Dakota

South Dakota NSF EPSCoR Researcher (2019-Present)
Dakota State University, Madison, SD
Part of the South Dakota research team awarded a $20 million grant investigating biofilms

Ph.D. Thesis Research, Department of Plant Pathology (2014-2019)
University of Minnesota, St. Paul, MN
Investigating the potential control of the alfalfa crown rot disease complex using transgenic approaches.

COMMITTEE WORK/INSTITUTIONAL SERVICE

Undergraduate Curriculum Committee, Representative (2023-Present)
Dakota State University
Science Coordinator (Department Head) (2023-Present)
Dakota State University
Teaching Committee, Chair (2023-Present)
American Phytopathological Society
General Beadle Honors Program, Committee member (2022-Present)
Dakota State University
Board Member (2022-Present)
Northern Plains Forage Association

Section Editor, Pathogen Profiles (2021-Present)
Plant Health Instructor
Natural Science Discipline Council, member (2021-Present)
South Dakota Board of Regents
University Research Committee, Representative (2020-Present)
Dakota State University
TriBeta Chapter Founder and Advisor (2020-Present)
Dakota State University
Athletics Committee, Representative (2019-2022)
Dakota State University
Plant Pathology Student Organization, President (2017-2018)
University of Minnesota
Plant Pathology Education Committee, Graduate Student Representative (2016-2019)
University of Minnesota
Teaching Committee, Committee member (2016-Present)
American Phytopathological Society

PROFESSIONAL MEMBERSHIPS

Midwest Forage Association, member (2020-Present)
South Dakota Academy of Science, member (2020-Present)
American Phytopathological Society, member (2016-Present)

Kristel K. Bakker, Ph.D.

College of Arts & Sciences, Dakota State University, Madison, SD 57042
Work (605) 256-5182, Home (605) 256-0894, kristel.bakker@dsu.edu

Education

Ph.D. Biological Sciences, South Dakota State University, Brookings, SD. 2000.
Dissertation Title: Nongame Bird Occurrence in Woodlands and Grasslands on Public Lands Throughout Eastern South Dakota.

Master of Science in Biology, South Dakota State University, Brookings, SD. 1996.
Thesis Title: Bird Community Attributes in Critical and Non-critical Areas within the Land-water Interface of a Prairie Lake.

South Dakota Teacher Certification, Dakota State University, Madison, SD.
Academic Honors. Certification for junior high and high school instruction in the following subjects: Life, Earth/Space, General and Physical Science, Chemistry, Biology, Mathematics, History, Geography, Psychology, junior high language arts, math, social science and science.

Bachelor of Science in Biology and Zoology, Chemistry minor, South Dakota State University, Brookings, SD. Academic Honors.

Professional Experience

Professor of Biology. August 2014-present. **Dakota State University**, Madison, SD.

Associate Professor of Biology. August 2006-2014. **Dakota State University**, Madison, SD.

Assistant Professor of Biology. May 2000-August 2006**. Dakota State University**, Madison.
Classes taught: Biology 101 Biology Survey I, Biology 151 General, Biology 165 Zoology, BIOL 221 Anatomy, BIOL 325 Physiology, BIOL 410 Conservation Biology, BIOL 492: Sp. Tp. Prairie Ecology, BIOL 492: Sp. Tp. Cells and Tissues, BIOL 592: Prairie Ecology: Tallgrass Prairie, BIOL 592: Prairie Ecology: Mixed Grass Prairie, SCTC 303 Biological Instrumentation, IDL Issues of Yellowstone National Park, Seed 302/303 Secondary and Middle School Science Methods; Eled 320 K-8 Science Methods

Adjunct Assistant Professor of Wildlife. 2001-present. **South Dakota State University**, Brookings, SD. Committee member for master of science and doctor of philosophy students, research advisor, assist graduate students, conduct research.

Graduate Faculty Member. 2015-present. South Dakota State University.

Biology Instructor. Aug. 1998-May 2000. Dakota State University.

Ornithology (WL 363) Laboratory Instructor for Dr. L.D. Flake. Spring 1998.

Ph.D. Research Assistant, South Dakota State University. 1996-2000.

Wildlife Technician, West River Project Leader. Summer 1996. State of South Dakota, SDSU-Wildlife and Fisheries, Brookings, SD. Obtained landowner permissions and completed avian surveys on selected wetlands in western South Dakota. Organized and submitted data sheets and receipts to main project leader. Kept detailed log book on landowner responses and daily activities. Supervised one technician.

Graduate Teaching Assistant. Aug. 1993-May 1996. South Dakota State University, Biology Department, Brookings, SD. Instructed three sections of anatomy laboratories, prepared quizzes and practical exams, proctored lecture exams.

Publications

2021 DeJong, J.R., K.F. Higgins, K.K. Bakker, and K.C. Jensen. A summation of egg size metrics representing 34 wild North American duck species from eggs collected during 1859-2010. Proceedings of the South Dakota Academy of Science 100:67-79.

2020 Bakker, K.K. South Dakota Species of Habitat Fragmentation Concern: Grassland Birds. Report developed for: U.S. Fish and Wildlife Service, South Dakota Ecological Services Field Office, Pierre, SD, 38 pp.

2020 J.K. Krakow, K.K. Bakker, K. Kelsey, R. Longsinger and K.C. Jensen. Grassland Bird Use of High and Low Diversity Prairie Plantings in Eastern South Dakota. South Dakota Bird Notes 71(3): 45. Abstract only.

2019 Thiele, J.P. and K.K. Bakker. The effect of landscape attributes on Burrowing Owl (*Athene cunicularia*) occupancy of black-tailed prairie dog colonies in western South Dakota. Journal of Raptor Research 53(4): 367-376.

2019 Bakker, K.K. Grassland Bird Research 1998-2018: What have we learned? South Dakota Bird Notes 71(2): 28. Abstract only.

2019 Krakow, J.K., **K.K. Bakker**, K.W. Kelsey, K.C. Jensen and R.C. Lonsinger. Grassland bird use of high and low diversity native prairie plantings. South Dakota Bird Notes 71(2): 24. Abstract only.

2018 Krakow, J.K., **K.K. Bakker**, K. Kelsey and K.C. Jensen. Grassland bird use of high and low diversity plantings. Proceedings of the South Dakota Academy of Science 97: *In Press.* Abstract only.

2016 Greer, M.J., **K.K. Bakker**, and C.D. Dieter. Grassland bird response to recent loss and degradation of native prairie in central and western South Dakota. The Wilson Journal of Ornithology. 128(2):278-289.

2015 Baker, N.J., C.D. Dieter, and **K.K. Bakker**. Reproductive success of colonial tree-nesting waterbirds in prairie pothole wetlands and rivers throughout northeastern South Dakota. American Midland Naturalist 174:132-149.

2013 Thiele, J.P., **K.K. Bakker**, and C.D. Dieter. Multiscale nest site selection by Burrowing

Owls in western South Dakota. The Wilson Journal of Ornithology 125(4): 763-774.

2012 Grovenburg, T. W., S. Kempema, J. A. Jenks, J. D. Stafford, T. Kirschenmann, R. W. Klaver, J. Thiele, and **K. Bakker**. Crucial habitat assessment tool – burrowing owls in the Dakotas. South Dakota Department of Game, Fish and Parks, Pierre, USA. 24 pp.

2012 Grovenburg, T. W., S. Kempema, J. A. Jenks, J. D. Stafford, T. Kirschenmann, R. W. Klaver, J. Thiele, and **K. Bakker**. Crucial habitat assessment tool – burrowing owls in South Dakota. South Dakota Department of Game, Fish and Parks, Pierre, USA. 24 pp.

2010 Higgins, K.F., K.C. Jensen, and **K.K. Bakker**. Suggestions for a new approach for use in assessing indicated breeding pair populations of ducks during spring in North America. Proceedings of the South Dakota Academy of Science 89:139-149.

2009 **Bakker, K.K.** and K.F. Higgins. Planted cover types and native prairie: Equivalent habitat for grassland birds? Western North American Naturalist 69(2):235-242.

2009 Ribic, C.A, R.R. Koford, J.R. Herkert, D.H. Johnson, N.D. Niemuth, D.E. Naugle, **K.K. Bakker**, D.A. Sample, and R.B. Renfrew. Area sensitivity in North American grassland birds: patterns and processes. Auk 126(2):233-244.

2008 May, S.M., K.F. Higgins, D.E. Naugle, **K.K. Bakker** and K.C. Jensen. Landscape Characteristics Affecting Habitat Use and Productivity of Ducks on Stockponds in Western South Dakota. Proceedings of the South Dakota Academy of Science 87: 63-84.

2006 Kelsey, K.W., D.E. Naugle, K.F. Higgins and **K.K. Bakker**. Planting trees in prairie landscapes: do the ecological costs outweigh the benefits? Natural Areas Journal 26:254-260.

2006 **K.K. Bakker**, S.L. Eggebo, K.F. Higgins, and D.E. Naugle. Grassland bird use of CRP fields that differ by age-class and cover type. Proceedings of the 19th North American Prairie Conference: 70-75.

2006 DeJong, J.R., D.E. Naugle, **K.K. Bakker**, F.R. Quamen and K.F. Higgins. Impacts of agricultural tillage on grassland birds in western South Dakota. Proceedings of the 19th North American Prairie Conference:76-80.

2006 Salo, E.D., K.F. Higgins, W.T. Barker, **K.K. Bakker,** and K.C. Jensen. Temporal effects of grazing regimes on non-game birds in North Dakota grasslands. Proceedings of the 19th North American Prairie Conference: 216-224.

2006 Salo, E.D., K.F. Higgins, B.D. Patton, **K.K. Bakker**, W.T. Barker, B. Kreft, and P.E. Nyren. Grazing intensity effects on vegetation, livestock and non-game birds in North Dakota mixed-grass prairie. Proceedings of the 19th North American Prairie Conference: 205-215.

2005 **Bakker, K.K.** South Dakota All Bird Conservation Plan. Wildlife Division Report 2005-09, South Dakota Department of Game, Fish and Parks, Pierre, SD.

2005 **Bakker, K.K.** and K.F. Higgins. Effects of plant species diversity in multifunctional grasslands on avian communities. XX International Grassland Congress: Offered Papers, p. 607.

2004 Higgins, K.F., R.G. Osborn, D.E. Naugle, and **K.K. Bakker**. Contrasting the potential effects of biomass fuel, soy-based fuel, ethanol and wind energy developments on northern Great Plains wildlife. Transactions of the 69th North American Wildlife Conference: 199-214.

2003 **Bakker, K.K.** and K.F. Higgins. Avian use of natural versus planted woodlands in Eastern South Dakota, U.S.A. Natural Areas Journal 23:121-128.

2003 **Bakker, K.K**., J.R. Dejong, and K.F. Higgins. Distribution of grassland birds in South Dakota. South Dakota Bird Notes 55:28-37, Corrected Maps 55:57-59.

2003 **Bakker, K.K.** A compilation and synthesis of avian research completed in South Dakota. Report to South Dakota Department of Game, Fish and Parks. South Dakota Department of Game, Fish and Parks, Wildlife Division Report No.2003-09, 72pp.

2003 **Bakker, K.K**. A synthesis of the effect of woody vegetation on grassland nesting birds. Proceedings of the South Dakota Academy of Science 82: 119-141.

2002 **Bakker, K.K.**, D.E. Naugle and K.F. Higgins. Incorporating landscape attributes into models for migratory grassland bird conservation. Conservation Biology 16: 1638-1646.

2002 **Bakker, K.K.** The effect of woody vegetation on grassland nesting birds: an annotated bibliography. U.S. Fish and Wildlife Service, Habitat and Population Evaluation Team completion report, Fergus Falls, MN.

2000 Naugle, D.E., K.F. Higgins, and **K.K. Bakker**. Effects of upland management practices on birds in the northern Great Plains region of the U.S. and southern Canada: a synthesis and review. Wildlife Technical Report No. 1, U. of Wisconsin-Stevens Point. 28 pp.

2000 **Bakker, K.K.** Avian occurrence in woodlands and grasslands on public areas throughout eastern South Dakota. Ph.D. dissertation, SDSU, Brookings, SD.

1999 Naugle, D.E., K.F. Higgins and **K.K. Bakker**. Habitat area requirements of wetland birds in western South Dakota. Proceedings of the South Dakota Academy of Science 78:129-138.

1998 **Bakker, K.K.** and K.F. Higgins. Are South Dakota's native prairie birds in jeopardy? South Dakota Conservation Digest 65(2):16-18.

1998 **Bakker, K.K.** and N.H. Troelstrup, Jr. Patterns in avian community structure and non-

point source disturbance potential along the land-water interface of a prairie pothole lake. Proceedings of the South Dakota Academy of Science 77:221-230.

1998 **Bakker, K.K.** and N.H. Troelstrup, Jr. Birds of the Oak Lake Field Station. South Dakota Bird Notes 50:58-60.

1997 Naugle, D.E., K.F. Higgins and **K.K. Bakker**. A synthesis and summary of the effects of grassland management practices on waterfowl in the Northern Great Plains region of the U.S. and southern Canada. *Completion Report for Ducks Unlimited-Canada.*

1996 **Bakker, K.K.** Bird community attributes in critical and noncritical areas within the land-water interface of a prairie lake. M.S. Thesis. South Dakota State University, Brookings, SD.

Presentations

2023 Aslesen and K.K. Bakker. Neonicotinoid Accumulation in Eggshells of Birds in the Wild. South Dakota Ornithologists' Union Fall Meeting. Vermillion, SD.

2023 M. Figura, J. Stafford, D. Roeder, and K. Bakker. Evaluating Avian Use of Cover Crops in the Corn Belt. South Dakota Chapter of The Wildlife Society Annual Meeting. Chamberlain, SD. March 8-10.

2023 E. Aslesen and K.K. Bakker. Neonicotinoid Accumulation in Eggshells of Birds in the Wild. Dakota State University Research Symposium.

2023 C. Vogel and K.K Bakker. Detecting Bias Among Personal Outcome Interviewers. Dakota State University Research Symposium

2022 E. Aslesen and K.K. Bakker. Neonicotinoid Accumulation in Eggshells of Birds in the Wild. South Dakota Ornithologists' Union Fall Meeting. Sioux Falls, SD. Sept 30-October 1.

2021 DeJong, J.R., K.F. Higgins, K.K. Bakker, and K.C. Jensen. A summation of egg size metrics representing 34 wild North American duck species from eggs collected during 1859-2010. Proceedings of the 106th South Dakota Academy of Science virtual meeting.

2020 J.K. Krakow, K.K. Bakker, K. Kelsey, R. Longsinger and K.C. Jensen. Grassland Bird Use of High and Low Diversity Prairie Plantings in Eastern South Dakota. South Dakota Chapter of The Wildlife Society Annual Meeting, Chamberlain, SD. February 28.

2019 J.K. Krakow, **K.K. Bakker**, K. Kelsey, R. Longsinger and K.C. Jensen. Grassland Bird Use of High and Low Diversity Prairie Plantings in Eastern South Dakota. South Dakota Ornithologists' Union Fall Meeting, Pierre, SD. October 4-6.

2019 J.K. Krakow, K.K. Bakker, K. Kelsey, R. Longsinger and K.C. Jensen. An evaluation of

high and low diversity plantings with respect to grassland bird utilization in eastern South Dakota. South Dakota Chapter of The Wildlife Society Annual Meeting, Chamberlain, SD. March 1.

2019 J.K. Krakow, K.K. Bakker, K. Kelsey, R. Longsinger and K.C. Jensen. An evaluation of high and low diversity plantings with respect to grassland bird utilization in eastern South Dakota. South Dakota Ornithologists' Union Fall Meeting. Madison, SD. October 12-14.

2018 J.K. Krakow, **K.K. Bakker**, K. Kelsey and K.C. Jensen. Grassland bird use of high and low diversity plantings in eastern South Dakota. South Dakota Chapter of The Wildlife Society Annual Meeting, Chamberlain, SD. February 28.

2018 J.K. Krakow, **K.K. Bakker**, K. Kelsey and K.C. Jensen. Grassland bird use of high and low diversity plantings. South Dakota Academy of Science Annual Meeting. April 12-14.

2017 J.K. Krakow and **K.K. Bakker**. Grassland bird use of high and low diversity native plantings. South Dakota Ornithologists' Union Fall Meeting. Spearfish, SD. October 21.

2016 K. Hendricks, **K.K. Bakker**, and C.D. Dieter. Improving survey methods to better detect rare grassland birds in South Dakota. The Wildlife Society Annual Meeting. October 17, Raleigh, North Carolina.

2016 K. Hendricks, **K.K. Bakker**, and C.D. Dieter. Grassland birds and roads: does abundance differ with distance from roadsides? South Dakota Chapter of the Wildlife Society Annual Meeting, Chamberlain, SD. Feb. 29-March 2.

2016 K. Hendricks, **K.K. Bakker**, and C.D. Dieter. Grassland birds and roads: does abundance differ with distance from roadsides? Midwest Fish and Wildlife Conference. Michigan.

2015 K. Hendricks, **K.K. Bakker**, and C.D. Dieter. Grassland birds and roads: does abundance differ with distance from roadsides? South Dakota Ornithologists' Union Fall Meeting. November 14, Brookings, SD.

2012 J. Thiele, **K.K. Bakker**, C.D. Dieter. Nest Site Selection by Burrowing Owls in Black-tailed Prairie Dog Colonies in Western South Dakota. South Dakota Chapter of The Wildlife Society Annual Meeting. March 2012. Oacoma, SD.

2011 J. Thiele, **K.K. Bakker**, C.D. Dieter. Nest Site Selection by Burrowing Owls in Black-tailed Prairie Dog Colonies in Western South Dakota. Grassland Birds and Landscape Symposium. Midwest Fish and Wildlife Conference. December 6, 2011. Des Moines, IA.

2011 J. Thiele, **K.K. Bakker**, C.D. Dieter. Habitat Characteristics of Burrowing Owl Nest Burrows and Randomly Selected Non-nest Burrows in Western South Dakota. South Dakota Ornithologists' Union Fall Meeting. October 8, 2011. Brookings, SD.

2011 J. Thiele, **K.K. Bakker**, C.D. Dieter. Distribution and Habitat Selection of the Western Burrowing Owl in Western South Dakota. South Dakota Academy of Science Annual Meeting. April 8, 2011. Oacoma, SD.

2011 J. Thiele, **K.K. Bakker**, C.D. Dieter. Distribution and Habitat Selection of the Western Burrowing Owl in Western South Dakota. Joint Meeting of the Wilson Ornithological Society, Cooper Ornithological Society, and Association of Field Ornithologists. March 11, 2011. Kearney, NE.

2011 J. Thiele, **K.K. Bakker**, C.D. Dieter. Distribution and Habitat Selection of the Western Burrowing Owl in Western South Dakota. Landscape and Climate Change Symposium. South Dakota Chapter of The Wildlife Society Annual Meeting. March 2, 2011. Oacoma, SD.

2011 **K.K. Bakker**. Landscape Change and the Plight of Grassland Birds. Landscape and Climate Change Symposium. South Dakota Chapter of The Wildlife Society Annual Meeting. March 2, 2011. Oacoma, SD.

2010 Higgins, K.F., K.C. Jensen, and **K.K. Bakker**. Suggestions for a new approach for use in assessing indicated breeding pair populations of ducks during spring in North America. The 95th Annual Meeting of the South Dakota Academy of Science, Oacoma, SD.

2010 K. Fisk, **K.K. Bakker**, K.C. Jensen, and R. Klaver. An evaluation of duck and ring-necked pheasant nest survival and nest density in relation to patch size and landscape level variables in eastern South Dakota. South Dakota Chapter of the Wildlife Society Annual Meeting, Chamberlain, SD.

2010 N., Baker, C.D. Dieter, **K.K. Bakker**. An evaluation of nesting and fledging success for six species of colonial tree-nesting waterbirds in northeast South Dakota. South Dakota Chapter of the Wildlife Society Annual Meeting, Chamberlain, SD.

2010 J. Thiele, **K.K. Bakker**, C.D. Dieter. Distribution and habitat selection of the western burrowing owl in western South Dakota. South Dakota Ornithologists' Union Fall Meeting, Vermillion, SD.

2010 K. Fisk, **K.K. Bakker**, K.C. Jensen, and R. Klaver. An evaluation of duck and ring-necked pheasant nest survival and nest density in relation to patch size and landscape level variables in eastern South DakotaThe 55th Annual Summer Meeting of the Central Mountains and Plains Section of The Wildlife Society, Oacoma, SD.

2010 N., Baker, C.D. Dieter, **K.K. Bakker**. An evaluation of nesting and fledging success for six species of colonial tree-nesting waterbirds in northeast South Dakota. The 55th Annual Summer Meeting of the Central Mountains and Plains Section of The Wildlife Society, Oacoma, SD.

2009 Baker, N., C. D. Dieter, and **K. Bakker**. Nesting success of colonial tree-nesting waterbirds on selected wetlands of northeast South Dakota. The 70th Annual Midwest Fish and Wildlife Conference, Springfield, IL.

2009 Baker, N., C. D. Dieter, and **K. Bakker**. Nesting success of colonial tree-nesting waterbirds on selected wetlands of northeast South Dakota. 33rd Annual Meeting– Waterbird Society, November 4–8, Cape May, New Jersey.

2009 Greer, M., **K.K. Bakker** and C.D. Dieter. An evaluation of habitat use and requirements for grassland birds of greatest conservation need in central and western South Dakota. The 94th Annual Meeting of the South Dakota Academy of Science, Aberdeen, SD. April 3-4.

2009 Baker, N. C.D. Dieter and **K.K. Bakker**. Nesting success of colonial tree-nesting waterbirds on selected wetlands of northeast South Dakota. The 94th Annual Meeting of the South Dakota Academy of Science, Aberdeen, SD. April 3-4.

2009 Greer, M., **K.K. Bakker** and C.D. Dieter. An evaluation of habitat use and requirements for grassland birds of greatest conservation need in central and western South Dakota. South Dakota Chapter of the Wildlife Society Annual Meeting, Chamberlain, SD.

2009 Baker, N. C.D. Dieter and **K.K. Bakker**. Nesting success of colonial tree-nesting waterbirds on selected wetlands of northeast South Dakota. South Dakota Chapter of the Wildlife Society Annual Meeting, Chamberlain, SD

2008 Greer, M., **K.K. Bakker** and C.D. Dieter. Habitat requirements for grassland bird species of greatest conservation need in South Dakota. The 69th Annual Midwest Fish and Wildlife Conference, Columbus, OH.

2008 Fisk, K., **K.K. Bakker**, K. Kelsey, K.C. Jensen. An evaluation of nesting success of ring-necked pheasants and waterfowl in relation to patch size, shape, landscape composition and the predator community on public lands and areas enrolled in the farmable wetlands program in eastern South Dakota. Poster presentation. United States Fish and Wildlife Service Regions 3 and 6 Wetland Management District Coordination Meeting, Brookings, SD, August 26-28.

2008 Greer, M., **K.K. Bakker** and C.D. Dieter. An evaluation of habitat use and requirements for grassland birds of greatest conservation need in central and western South Dakota. South Dakota Ornithologists' Union Fall Meeting, Pierre, October 10-12.

2008 Baker, N. C.D. Dieter and **K.K. Bakker**. Nesting success of colonial tree-nesting waterbirds on selected wetlands of northeast South Dakota. South Dakota Ornithologists' Union Fall Meeting, Pierre, October 10-12.

2008 May, S.M., K.F. Higgins*, D.E. Naugle, **K.K. Bakker** and K.C. Jensen. Landscape Characteristics Affecting Habitat Use and Productivity of Ducks on Stockponds in Western South Dakota. The 93rd Annual meeting of the South Dakota Academy of Science, Chamberlain, SD.

2006 Berman, G*., **K.K. Bakker** and K.F. Higgins. Grassland bird nesting success in

fragmented and unfragmented landscapes in northcentral South Dakota. The 66th Annual Midwest Fish and Wildlife Conference, Omaha, NE.

2006 Berman, G*., **K.K. Bakker** and K.F. Higgins. Grassland bird nesting success in fragmented and unfragmented landscapes in northcentral South Dakota. South Dakota Chapter of the Wildlife Society Annual Meeting, Chamberlain, SD, March 6-8.

2005 Berman, G.*, **K.K. Bakker**, and K.F. Higgins. An evaluation of nesting success of grassland birds in fragmented and unfragmented areas in the mixed grass prairie region of South Dakota. South Dakota Ornithologists' Union Fall Meeting, Brookings, Sept. 30-Oct. 2.

2005 **Bakker, K.K.*** and K.F. Higgins. Effects of plant species diversity in multifunctional grasslands on avian communities. XX International Grassland Congress, Dublin, Ireland, June 26-July 1.

2004 Eggebo, S.L., **K.K. Bakker***, and K.F. Higgins. Passerine abundance in conservation reserve program grasslands of differing age-classes and cover types in eastern South Dakota. The 19th North American Prairie Conference, Madison, WI, August 8-12.

2004 Dejong, J.R.*, **K.K. Bakker**, K.F. Higgins, and D.E. Naugle. Landscape fragmentation and grassland patch size effects on non-game grassland birds in xeric mixed-grass prairies of western South Dakota. The 19th North American Prairie Conference, Madison, WI, August 8-12.

2004 Salo, E.D., K.F. Higgins*, **K.K. Bakker**, and W.T. Barker. Effects of temporal grazing treatments on nongame birds in North Dakota mixed-grass prairie. The 19th North American Prairie Conference, Madison, WI, August 8-12.

2004 Higgins, K.F., E.D. Salo*, B.D. Patton, K.K. Bakker, W.T. Barker, B. Kreft, and P.E. Nyren. Effects of grazing intensity treatments on vegetation, livestock and nongame birds in North Dakota mixed-grass prairie. The 19th North American Prairie Conference, Madison, WI, August 8-12.

2003 M.M. Mills*, **K.K. Bakker**, and K.F. Higgins. The effect of plant species diversity on the occurrence and density of prairie birds. Fall meeting of the South Dakota Ornithologists' Union, Madison, SD, October 10-12.

2003 **Bakker, K.K.*** A summary of the effect of woody vegetation on grassland nesting birds. The 88th Annual meeting of the South Dakota Academy of Science, April 4, Rapid City, SD.

2003 Salo, E. D.*, K. F. Higgins, W. T. Barker, and **K. K. Bakker**. 2003. Effects of four-levels of grazing intensity treatments on nongame birds in North Dakota mixed-grass prairie. South Dakota Chapter of the Wildlife Society, Mar. 3-5, Aberdeen, SD.

2003 Salo, E.D.*, K.F. Higgins, W.T. Barker and **K.K. Bakker**. Effects of four-levels of grazing intensity treatments on nongame birds in North Dakota mixed-grass prairie. The 56th Annual Meeting of the Society for Range Management, Casper, WY, Feb. 2- 6.

2003 Salo, E.D., K.F. Higgins*, W.T. Barker and **K.K. Bakker**. Temporal effects of grazing systems on nongame birds in North Dakota grasslands. The 56th Annual Meeting of the Society for Range Management, Casper, WY, Feb. 2-6.

2002 Salo, E.D.*, K.F. Higgins and **K.K. Bakker**. Temporal effects of grazing systems on nongame birds in North Dakota Grasslands. The Wildlife Society 9th Annual Conference, Bismarck, ND, Sept. 24-28.

2002 **Bakker, K.K.***, D.E. Naugle and K.F. Higgins. Incorporating landscape attributes into models for migratory grassland bird conservation. Central Mountains and Plains Section of the Wildlife Society annual meeting. Lead, SD, July 16-18.

2002 Naugle, D.E.*, **K.K. Bakker**, M. Estey, N. Niemuth, and K.F. Higgins. Incorporating landscape attributes into models for migratory grassland bird conservation. International Association for Landscape Ecology-United States Regional Association. April 23-27, Lincoln, NE.

2001 **Bakker, K.K.*** and K.F. Higgins. Grassland bird use of switchgrass fields in South Dakota. Bioenergy Feedstock Development Programs Subcontractor's and Collaborators Meeting. Memphis, TN, Nov. 6-9.

2001 **Bakker, K.K.*** Grassland and woodland bird habitat requirements in eastern South Dakota. Banquet speaker for the South Dakota Ornithologists' Union spring meeting, Martin, SD. May 19.

2001 Higgins, K. F., D. E Naugle and **K. K. Bakker**. Integrating the use of grassland management tools: matching objectives and techniques. Native Plant Summit-6, Brandon, Manitoba, Canada.

2001 Higgins, K. F. and **K. K. Bakker**. Bird occurrence and vegetation structure qualities in Conservation Reserve Program grasslands being managed for biomass fuel harvesting. Department of Energy (DOE) Biomass/Biofuels Annual Workshop, Memphis, Tennessee.

2000 Higgins, K. F., **K. K. Bakker** and A. A. Boe. Nongame bird occurrence in Conservation Reserve Program fields managed for biomass fuels research. Herbaceous Research Contractors Workshop, Department of Energy (DOE)/Oak Ridge National Laboratory

1999 Naugle, D.E., K.F. Higgins and **K.K. Bakker***. Habitat area requirements of wetland birds in western South Dakota. The 84th Annual Meeting of the South Dakota Academy of Science, Madison, SD., April 16.

1998 **Bakker, K.K.***, K.F. Higgins, D.E. Naugle, and S.M. Nusser. Effects of tract size and surrounding land use on avian species in a South Dakota agricultural landscape. The 60th Annual Midwest Fish and Wildlife Conference, Cincinnati, OH.

1998 **Bakker, K.K.***, K.F. Higgins, and D.E. Naugle. Grassland and woodland bird occurrences on public lands in Eastern South Dakota. Fall Meeting of the South Dakota Ornithologists' Union. Pierre, S.D., Oct. 3.

1998 **Bakker, K.K.***, K.F. Higgins**,** and S.M. Nusser. Grassland bird occurrences on public lands in eastern South Dakota. South Dakota Chapter of the Wildlife Society, Pierre, SD.

1997 **Bakker, K.K.***, K.F. Higgins, and S.M. Nusser. Nongame bird occurrence by habitat type on public lands in eastern South Dakota. The 59th Annual Midwest Fish and Wildlife Conference, Milwaukee, WI.

1997 **Bakker, K.K.** and N.H. Troelstrup, Jr.***.** Nongame birds occupying the land-water interface of Oak Lake. The 82nd Annual meeting of the South Dakota Academy of Science, Aberdeen.

1995 **Bakker, K.K.*** and N.H. Troelstrup, Jr. Bird community attributes in critical and noncritical areas within the land-water interface of a prairie lake. South Dakota Ornithologists' Union Fall Meeting, Madison, SD.

1994 **Bakker, K.K.**, J.L. Foley, C.K. Kraft and N.H. Troelstrup, Jr. Integrated bioassessment to evaluate critical areas within the land-water interface. Poster Presentation, Great Plains Limnology Conference, White, SD.

Invited Presentations

2018 **K.K. Bakker.** Grassland Birds: what have we learned? South Dakota Ornitholgists' Union Fall Meeting, Banquet speaker. October 13.

2017 **K.K. Bakker**. Grassland Birds: what have we learned? Biology seminar. University of South Dakota.

2015 **K.K. Bakker**. Grassland birds and cows: putting them together. Agricultural Summit. Madison, SD. Feb. 10.

2011 J. Thiele, **K.K. Bakker**, C.D. Dieter. Nest Site Selection by Burrowing Owls in Black-tailed Prairie Dog Colonies in Western South Dakota. Grassland Birds and Landscape Symposium. Midwest Fish and Wildlife Conference. December 6, 2011. Des Moines, IA.

2011 **K.K. Bakker**. Landscape Change and the Plight of Grassland Birds. Landscape and Climate Change Symposium. South Dakota Chapter of The Wildlife Society Annual Meeting. March 2, 2011. Oacoma, SD.

2011 J. Thiele, **K.K. Bakker**, C.D. Dieter. Distribution and Habitat Selection of the Western Burrowing Owl in Western South Dakota. Landscape and Climate Change Symposium. South Dakota Chapter of The Wildlife Society Annual Meeting. March 2, 2011. Oacoma, SD.

2009 **K.K. Bakker**, The effect of trees on grassland nesting birds. Natural Resource Conservation Service regional training. Brookings, SD, March 25.

2008 **K.K. Bakker**, Avian use of natural versus planted woodlands. Invited Speaker. Great Plains riparian forest management summit, Sioux Falls, SD, September 9-11.

2008 **K.K. Bakker**, Managing diversity on rangelands. Invited Speaker. South Dakota Grazing School sponsored by SD Cooperative Extension Service, South Dakota Grassland Coalition, USDA-Natural Resources Conservation Service, and Lower James Resource Conservation and Development, Oacoma, SD, September 8-10.

2008 **K.K. Bakker** and K.F. Higgins. Grass, gas and biomass. Invited Speaker. United States Fish and Wildlife Service Regions 3 and 6 Wetland Management District Coordination Meeting, Brookings, SD, August 26-28.

2008 **K.K. Bakker**, Birds and cows. Invited speaker. South Dakota Grassland Coalition Bird Watching Tour, June 6-7, Bristol, SD.

2008 **K.K. Bakker**, Birds and cows: Putting them together. Invited speaker. South Dakota Grassland Coalition Bird Watching Tour, June 6-7, Bristol, SD.

2008 **K.K. Bakker**, Managing grassland birds. Invited speaker, USDA-Natural Resource Conservation Service statewide workshop. Huron, SD, June 17-19.

2008 **Bakker, K.K.** A review of the effect of woody vegetation on grassland birds. Invited Speaker. North Dakota Chapter of the Wildlife Society Annual Meeting. Grand Forks, ND, Jan. 30-Feb. 1.

2006 **Bakker, K.K.** Contrasting the potential effects of biomass fuel, soy-based fuel, ethanol and wind energy developments on northern Great Plains wildlife. Special Energy Symposium, South Dakota Academy of Sciences annual meeting. Chamberlain, SD, April 6-7.

2006 **Bakker, K. K.** and K.F. Higgins. Planting grass for nongame birds: Which mix is best? South Dakota Chapter of the Wildlife Society Annual Meeting, Chamberlain, SD, March 6-8.

2006 **Bakker, K. K.** Development of the South Dakota All Bird Conservation Plan. South Dakota Chapter of the Wildlife Society Annual Meeting, Chamberlain, SD, March 6-8.

2004 Higgins, K.F., R.G. Osborn, D.E. Naugle, **K.K. Bakker,** and K.J. Forman. Contrasting the potential effects of biomass fuel, soy-based fuel, ethanol and wind energy developments

on northern Great Plains wildlife. The 69th North American Wildlife and Natural Resources Conference, Spokane, Washington, March 16-20.

2002 **Bakker K.K.*** Incorporating scale into models for migratory grassland bird conservation. University of South Dakota Graduate Seminar, Feb. 11.

2000 **Bakker, KK***, K.F. Higgins, D.E. Naugle. Incorporating scale into models for migratory grassland bird conservation. Grassland Bird Symposium. The 62nd Annual Midwest Fish and Wildlife Conference, Minneapolis, MN. December 3-6.

Grants/Contracts/Current Research

2019-2021 **K.K. Bakker.** Development of a Species of Fragmentation Concern list for U.S. Fish and Wildlife Service and S.D. Department of Game, Fish and Parks. Contract $2500.

2018-2020 **K.K. Bakker.** Avian use of low and high diversity grassland plantings. U.S. Fish and Wildlife Service, Madison Wetland Management District, travel.

2012-2017 **K.K.Bakker (P.I.)**. Development of a long term monitoring plan for grassland birds in South Dakota. Wildlife Action Plant Competitive Grant. $117,000 (amended 2014 from 75,000 to 117,000).

2009-2012 **K.K. Bakker (P.I.)** and C.Dieter. Distribution of Burrowing Owls in Western South Dakota. Wildlife Action Plan Competitive Grant. $50,000.

2007-2110 Dieter, C and **K.K. Bakker**. Waterbird nesting study. Funded by South Dakota Wildlife Action Plan Competitive Grant. $50,000

2007-2010 **Bakker, K.K. (P.I.)** and K.C. Jensen (Ass't P.I.) An evaluation of nesting success of ring-necked pheasants and waterfowl in relation to patch size, shape, landscape composition and the predator community on public lands and areas enrolled in the farmable wetlands program in eastern South Dakota. Funded by S.D. Department of Game, Fish and Parks. $140,000.

2006-2009 **Bakker, K.K.** (P.I.) An evaluation of habitat use and requirements for grassland bird species of greatest conservation need in central and western South Dakota. Funded by South Dakota Wildlife Action Plan Competitive Grant. $99,600.

2004-2007 **Bakker, K.K.** (P.I.) and K.F. Higgins. Nesting success of grassland birds in fragmented and unfragmented prairie. Funded by the South Dakota Department of Game, Fish and Parks. $185,000.

2004 Course Redesign Grant, Dakota State University.

2003-2004 **Bakker, K.K.** (P.I.) Development of an All-Bird Conservation Plan for South Dakota. Contract with S.D. Game, Fish and Parks. $20,000.

2002 **Bakker, K.K.** (P.I.) A comprehensive literature review of avian research in South

Dakota. Contract with S.D. Department of Game, Fish and Parks. $10,000

2002 **Bakker, K.K.** (P.I.) The effects of woody vegetation on grassland nesting birds: a literature review. Contract with U.S. Fish and Wildlife Service Habitat and Population Evaluation Team, Fergus Falls, MN. $1500.

2002-2005 Higgins, K.F. and **K.K. Bakker.** (Co-P.I.) Monotypic versus multi-species Conservation Reserve Program grasslands for avian species. Funded by Bioenergy Feedstock Development Program. $40,000.

2000-2001 Higgins, K.F. and **K.K. Bakker**. (Co-P.I.) The effect of mowing Conservation Reserve Program grasslands for biofuels on grassland birds. Bioenergy Feedstock Development Program. $30,000

Graduate Students and Committees

Research Thesis Advisor

Jacquelyn Krakow. Master of Science, South Dakota State University Department of Natural Resource Management. Current Student.

Kassondra Hendricks. Master of Science, South Dakota State University Department of Natural Resource Management.

Hendricks, Kassondra. 2017. Improving survey methodology to monitor rare grassland birds in South Dakota. M.S. Thesis, South Dakota State University.

Jason Thiele. Master of Science, South Dakota State University Department of Natural Resource Management.

Thiele, Jason. 2012. Burrowing owl distribution and nest site selection in western South Dakota. M.S. Thesis, South Dakota State University.

Nathan Baker. Master of Science, South Dakota State University Biology and Microbiology Department.

Baker, Nathaniel. 2010. Nesting success of colonial tree nesting waterbirds on selected wetlands in northeast South Dakota. M.S. Thesis, South Dakota State University.

Keith Fisk, Master of Science, South Dakota State University Wildlife and Fisheries Sciences Department.

Fisk, Keith J. 2010. An evaluation of duck and ring-necked pheasant nest survival and nest density in relation to patch size and landscape variables in eastern South Dakota. M.S. Thesis, South Dakota State University.

Mitch Greer, Master of Science, South Dakota State University Biology and Microbiology Department.

Greer, Mitchell. 2009. An evaluation of habitat use and requirements for grassland bird species of greatest conservation need in central and western South Dakota. M.S. Thesis, South Dakota State University.

Gillian Berman, Master of Science, South Dakota State University Wildlife and Fisheries Sciences Department.

Berman, Gillian. 2007. Nesting success of grassland birds in fragmented and unfragmented landscapes of north central South Dakota. M.S. Thesis, South Dakota State University, 64 pp.

Graduate Committee Member at SDSU and USD

2019-2023. Graduate Committee. Megan Figura, Master of Science. South Dakota State University.

2015-2018. Graduate Committee. Michelle Bouchard, Doctor of Philosophy. South Dakota State University.

2015-2017. Graduate Committee. Jarrett Pfrimmer, Doctor of Philosophy. South Dakota State University.

2010-2013**.** Graduate Committee. Julie R. DeJong, Doctor of Philosophy. South Dakota State University.

2004-2006. Graduate Committee. Nan Clarke, Master of Science. South Dakota State University.

2002-2005. Graduate Committee. Jay D. Carlisle, Doctor of Philosophy. University of South Dakota.

2001-2005. Graduate Committee. Tom Cooper, Doctor of Philosophy. South Dakota State University.

2001-2003 Graduate Committee Member for Eric D. Salo, Master of Science. South Dakota State University.

1999-2001 Graduate Committee Member for Julie R. DeJong, Master of Science. South Dakota State University.

1999-2001 Graduate Committee Member for Shawn M. May, Master of Science. South Dakota State University.

1999-2001 Graduate Committee Member for Sarah L. Eggebo, Master of Science. South Dakota State University.

1999-2001 Graduate Committee Member for Kyle W. Kelsey, Master of Science. South Dakota State University.

Professional Contributions

Peer referee for:

Ecological Applications
Waterbirds
Acta Oecologica
Journal of Applied Ecology
Wilson Bulletin
Journal of Field Ornithology
Proceedings of the North American Prairie Conference
Wetlands
Ecography
Biological Conservation
Western North American Naturalist
BioEnergy Research
South Dakota Academy of Science
Landscape Ecology

2023 Session moderator. South Dakota Academy of Science Annual Meeting.

2021-present. South Dakota Ornithologists' Union Executive Member Board of Directors.

2009-present. Higgins Endowment Advisory Committee, South Dakota State University.

2008-present. South Dakota Grassland Coalition Bird Tour Steering Committee.

2008-2016 South Dakota Breeding Bird Atlas Technical Committee.

2012 Wildlife Mentor to students in Wildlife 400, South Dakota State University.

2011 United States Fish and Wildlife Service's Prairie Reconstruction Workshop, Invited Expert, Madison, SD. Sept.

2009-2013 Graduate Committee. Julie R. DeJong, Doctor of Philosophy. South Dakota State University.

2006 Natural Resource Conservation Service invited workshop session leader. Managing grasslands for nongame birds. Huron, SD. August 24.

2001-2008 Treasurer and Executive Board Member for the South Dakota Academy of Sciences.

2001-2006 Consultant for Natural Resources Conservation Service. Organized a grassland bird monitoring program on grazing systems in South Dakota.

2004 South Dakota All Bird Workshop sponsored by the South Dakota Department of Game, Fish and Parks and the International Wildlife, invited participant and discussion leader, Pierre, SD, Aug. 16-17.

2001-2004. South Dakota Ornithologists' Union board of directors.

2004 Dakota State University Faculty Research Education Seminar Hour (FRESH) presenter.

2004 Proctored proficiency tests. Dakota State University, Fall term.

2003 South Dakota Department of Game, Fish and Parks Land Management Meeting. Invited presenter on habitat requirements of grassland and woodland birds and the effects of woody vegetation on grassland nesting birds. Mitchell, SD, April 16.

2003 Chair of the Wildlife Session at the 88th Annual South Dakota Academy of Science, Rapid City, SD, April 4.

2003 Monitoring songbirds on managed grazing systems planning session. Invited consultant. Jan. 18th. Hosted by Natural Resources Conservation Service, Chamberlain.

2002 Completed a chapter review for Essential Biology, 2nd Edition, Benjamin Cummings.

2002 Proctored proficiency tests. Dakota State University. Spring term.

2001 Proctored proficiency tests. Dakota State University. Fall term.

2001 Grassland Bird Advisory Team member at the 63rd Annual Midwest Fish and Wildlife Conference, Des Moines, IA. Dec. 9-12.

2001 Monitoring songbirds on managed grazing systems planning session. Natural Resources Conservation Service. Invited consultant. Aug. 8.

2001 Partners in Flight bird conservation planning meeting invited consultant. Pierre, SD. June 26.

2001 United States Fish and Wildlife Service and Ducks Unlimited meeting on delineating grassland bird conservation areas. Invited consultant. Fergus Falls, MN, January 17-18.

2000 Participant, Regional Evaluation of Area Sensitivity in Grassland Birds Workshop, Madison, WI. May 3-5.

1999 Participant, Regional Evaluation of Area Sensitivity in Grassland Birds Workshop, Madison, WI. August 17-18.

Professional Development, Extension and Education Activities

2018-present Wildlife Hike each fall with 2nd graders from Madison Elementary School.

2018 Invited speaker on grassland birds, Roosevelt High School, Sioux Falls, SD.

2018 Grassland Birds and Grassland Conservation, 3-part series, *Madison Daily Leader.*

2013 Invited speaker on grassland birds, Rotary Club, Madison, SD.

2013 Invited Speaker on Burrowing Owls, Kiwanis Club, Madison, SD.

2013 Burrowing Owl research featured in article in the *Capital Journal*, Pierre, SD.

2013 Featured in an article in the *Tri-state Neighbor*.

2012 Speaker to George-Little Rock environmental science classes.

2009 Assessment Workshop, DSU.

2009 Invited Speaker on grasslands and grassland birds, Kiwanis Club, Madison, SD.

2009 Invited Speaker. Conducting research on grassland birds, Delta Kappa Gamma, Madison, SD.

2008 *Argus Leader*. Research subject of 5November 08 Argus Leader article titled, "Project charts waterbirds in S.D."

1997-2010 Instructor of two 4-hour seminars entitled, "Bird Identification" and "Advanced Birding" at the 3-day Becoming an Outdoors Woman Workshop sponsored by South Dakota Game, Fish and Parks.

2006 Instructor of two 4-hour sessions entitled, "Birds, Beaks and Feet" at the weekend Becoming an Outdoors Family sponsored by South Dakota Department of Game, Fish and Parks, Lake Herman State Park, June.

2005 Advising workshop participant, August

2004 Field Checklist of Birds for Oakwood Lakes State Park and nearby lands, compiler.

2003 Leader of the Bird Watching Walk at the Lake Herman State Park Jubilee, July 20.

2003 Co-presenter of "Why Do Birds Sing and Fly?" at the Natural Areas Biodiverstiy Day, Oakwood State Park, June 21.

2003 Continuing education: CED 592 Special Topics in Educational Technology, Dakota State University, Spring semester.

2001 Instructor of Bird Basics at the South Dakota Wildlife Federation Camp. June 4-6, Custer, SD.

2000 South Dakota Game, Fish and Parks Outdoor Campus instructor of 3-hour session titled, "Bird Identification", April 29.

1999 Science Camp Instructor. Oak Lake Field Station. Instructed a 4-hour session on Ornithology for middle school science camp participants.

1999 South Dakota Game Fish and Parks Outdoor Campus co-instructor for 3-hour session titled, "Bird Identification", May 1.

1998 South Dakota Game, Fish and Parks Outdoor Campus co-instructor for 3-hour session titled, "Birds and Bagels", May 15.

1998 Outdoor Women of South Dakota. Presented two 3-hour seminars entitled, "Bird Feeders and Bird Watching". Thunderstick Lodge, Chamberlain, SD. March 28.

Awards and Scholarships

2023	State of South Dakota Longevity
2013	State of South Dakota Longevity
2012	DSU Merrill Hunter Award for Excellence in Research
2005	Who's Who Among America's Teachers, 9th edition, nominated by student
2004	Who's Who Among America's Teachers, 8th edition, nominated by student
2003	State of South Dakota Longevity (10yrs)
1999	Outstanding Wildlife Ph.D. Student award from the South Dakota Chapter of the Wildlife Society
1998	South Dakota Ornithologists' Union K. H. Husmann Memorial Scholarship
1997-present	Honor Society of Phi Kappa Phi
1995-present	Gamma Sigma Delta Honor Society
1995	South Dakota Ornithologists' Union K. H. Husmann Memorial Scholarship

Present Affiliations

2009-present	Delta Kappa Gamma
2001-present	South Dakota Academy of Science
1998-present	South Dakota Academy of Science
1998-present	The Wildlife Society: National Organization, Central Mountains and Plains Section and South Dakota Chapter
1997-present	National Wildlife Federation
1995-present	South Dakota Ornithologists' Union (Life member)
1995-present	The Nature Conservancy

Leadership Roles:

2021-present Executive Board Member, South Dakota Ornithologists' Union
2001-2008 Treasurer and Executive Board Member, South Dakota Academy of Science
2001-2003 Executive Board Member, South Dakota Ornithologists' Union

Nevine H. Nawar, M.D., Ph.D.

924 NE 6th Street, Madison SD 57042

Phone : (605) 270-3845

E-mail : nevine.nawar@gmail.com

Education

Ph.D. - Public Health and Preventive and Social Medicine,
Faculty of Medicine, Alexandria University, Egypt, 2002.

Ph.D. dissertation in title "*A Study of the Risk Factors for Deviance among Boys in Alexandria and a Program for Intervention*"

M.S. - Public Health and Preventive and Social Medicine,
Faculty of Medicine, Alexandria University, Egypt, 1994.

M.S. thesis in title "*A Study of the Epidemiological Features among Deaf-Mute Children in Alexandria*"

MBBch. (MD) - Faculty of Medicine, Alexandria University, Egypt, 1988.

Research interests

Information technology in public health; Social determinants of health; Health education; Mental health; Rural health; Children with disabilities

Professional Training

Fellowship at the Social Medicine Department, School of Medicine, Harvard University, 1999 - 2001.

Attended courses in Child Growth and Development, Adolescent Psychology, and Cognitive Psychology at the Department of Psychology, School of Arts, University of Massachusetts at Amherst, 2000.

Attended courses in Advanced Nutrition, and Clinical Nutrition at the Department of Nutrition, School of Public Health, University of Massachusetts at Amherst, 1999.

Attended courses in Applied Epidemiology, Epidemiological Design, and Controversial Issues in Nutrition, School of Public Health, University of Hawaii at Manoa, 1994 - 1995.

World Health Organization training in Child Health, Children's Hospital, London, 1992.

Attended courses in Teaching Methods and Philosophy, College of Education, Alexandria University, 1991.

Professional Experience

Senior Lecturer (2018- present)

College of Arts and Sciences, Dakota State University, U.S.A.

- Taught courses in applied basic sciences - Department of Science, College of Arts and Sciences.
- Taught one upper-division course in Human Anatomy and Physiology – Department of Science, College of Arts and Sciences.
- Taught two graduate courses in Foundations of Clinical Practice and Socioeconomic Determinants of Health, HIM Programs- College of Business and Information Systems.
- Taught one course in Fundamentals of Human Disease- College of Business and Information Systems.
- Served as a member of the Institutional Review Board (IRB).
- Served as the General Education Assessment Lead for the area of Natural Sciences.

Lecturer (2011- 2018)

College of Arts and Sciences, Dakota State University, U.S.A.

- Taught courses in applied basic sciences - Department of Science, College of Arts and Sciences.
- Taught one upper-division course in Human Anatomy and Physiology – Department of Science, College of Arts and Sciences.
- Served as a member of the Institutional Review Board (IRB).

Adjunct Instructor (2004 – 2011)
College of Arts and Sciences, Dakota State University, U.S.A.

- Taught courses in applied basic sciences - Department of Science, College of Arts and Sciences.
- Taught one upper-division course in gerontology – College of Education.

Assistant Professor (2002 - 2003)
Department of Public Health, School of Medicine, Alexandria University, Egypt

- Taught courses in nutrition, child and maternity health, health education, rural health, health care delivery systems, and communicable diseases.
- Developed and redesigned course teaching material and practical component, as part of a curriculum committee.
- Taught a graduate course in nutrition at the Nursing Institute, Alexandria University.

Lecturer (1995 - 2002)
Department of Public Health, School of Medicine, Alexandria University, Egypt

- Taught courses in geriatrics, mental health, non-communicable diseases, and epidemiology.
- Taught undergraduate courses in public health at the Nursing School, Alexandria University.
- Research interest emphasized child health problems with particular focus on child mental health problems.
- Member of a multidisciplinary team that launched the first program to promote mental health among school children in Alexandria. The program was partly funded by the World Health Organization.

Assistant Lecturer (1990 - 1995)
Department of Public Health, School of Medicine, Alexandria University, Egypt

- Conducted the practical component of courses, which included child and maternity health, health problems of the elderly, rural health, health education, and children with disabilities.
- Taught undergraduate courses in public health at the Nursing School, Alexandria University.
- Participated in a World Health Organization funded survey to identify microbial causes for diarrhea among children living in rural communities in Egypt.
- Assisted in a community survey to recognize health problems in poor and underserved urban communities in Egypt.
- Research focus was on children with disabilities.

General Practitioner (1989 - 1990)
Department of Pediatrics, School Health Insurance, Alexandria

- Treated cases with minor illnesses and injuries.
- Identified and referred cases in need of specialist assessment.

Intern (1988 - 1989)
Main University Hospital, Alexandria

- Medical training in anesthesia, emergency medicine, pediatrics, obstetrics, surgery, internal medicine, and clinical pathology.

Honors and Awards

Alexandria University honors award (1988).

Alexandria University distinction awards (1982-1987).

Certificate of Merit awarded in recognition of outstanding results in the British General Certificate of Education, Victory College (1983).

Certificate of Merit awarded in recognition of devoted services while serving as a Vice Head Girl at the English Girls' College (1982).

Certificate of Merit awarded in recognition of devoted services while serving as a prefect at the English Girls' College (1981).

Certificates of Merit and tuition waver awarded for being the first at the grade final examination, English Girls' College (1978 - 1982).

Professional Memberships

Syndicate of Physicians, Egypt.

The Egyptian Association for Child Mental Health.

Publications

Articles in peer-reviewed journals

- El-Gayar, O.F., Ofori, M. and Nawar, N. (2021). On the Efficacy of Behavior Change Techniques in mHealth for Self-Management of Diabetes: A Meta-Analysis, *Journal of Biomedical Informatics* 119 (2021) 103839
- Ambati, L. S., El-Gayar, O. F., & Nawar, N. (2020). Influence Of The Digital Divide And Socio-Economic Factors On Prevalence Of Diabetes. Issues In Information Systems, 21(4), Article 4. https://doi.org/10.48009/4_iis_2020_103-113
- El-Gayar, O.F., P. Timsina, N. Nawar, and W. Eid. (2013). A systematic review of IT for Diabetes Self-Management: Are we there yet?,*International Journal of Medical Informatics* 82(8), 637-52.
- El-Gayar, O.F., P. Timsina, N. Nawar, and W. Eid. (2013). Mobile Applications for Diabetes Self-Management: Status and Potential, *Journal of Diabetes Science and Technology* 7(1), 247-262.

Articles in peer-reviewed conference proceedings

- Nawar, N., El-Gayar, O., LoknathSai, A., & Giridhar, B. (2022). Social Media for Exploring Adverse Drug Events Associated with Multiple Sclerosis. Proceedings of the 55th Hawaii International Conference on System Sciences. Hawaii International Conference on System Sciences.
- Ambati, L. S., El-Gayar, O., & Nawar, N. (2021). Design Principles for Multiple Sclerosis Mobile Self-Management Applications: A Patient-Centric Perspective. AMCIS 2021 Proceedings. https://aisel.aisnet.org/amcis2021/healthcare_it/sig_health/11
- El-Gayar, O., Nawar, N., & Timsina, P. (2013). A mhealth architecture for diabetes self-management system. 19th Americas Conference on Information Systems, AMCIS 2013 - Hyperconnected World: Anything, Anywhere, Anytime, 1.

- Timsina, P., El Gayar, O., & Nawar, N. (2014). Leveraging Advanced Analytics to Generate Dynamic Medical Systematic Reviews. 20th Americas Conference on Information Systems, AMCIS 2014. http://aisel.aisnet.org/cgi/viewcontent.cgi?article=1540&context=amcis2014
- Timsina, P., El-Gayar, O., & Nawar, N. (2014). Information technology for evidence based medicine: Status and future direction. 20th Americas Conference on Information Systems, AMCIS 2014.

Book Chapters

- El-Gayar, O. F., Ambati, L. S., & Nawar, N. (2020). Wearables, Artificial intelligence, and the Future of Healthcare. In AI and Big Data's Potential for Disruptive Innovation (pp. 104–129).

Posters

- Ambati, L., El-Gayar, O. and Nawar, N. "Understanding the Influence of Digital Divide and Socio-Economic Factors on the Prevalence of Diabetes", DSU 2019 Research Symposium (Received a best poster award, 3rd place).

Service to Students and Mentoring in Research

- Advanced Data Analytics for Systemic Review Creation and Update. A dissertation submitted to Dakota State University in partial fulfillment of the requirements for the degree of Doctor of Science in Information Systems**.**
- Design Principles for App-Based Healthcare Interventions: A Mixed Method Approach**.** A doctoral dissertation proposal submitted to Dakota State University in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Information Systems.

Committee Memberships

Member of the Institutional Review Board, Dakota State University, U.S.A. (2012-2022)

General Education Assessment Lead for the area of Natural Sciences, Dakota State University

Languages

Fluent in English and Arabic. Adequate knowledge of French.

Hobbies

Reading, poetry, art, in addition to a variety of sports that include yoga.

DR. THOMAS ALEXANDER DECECCHI

Assistant Professor

Biology Department,

Dakota State University

820 N. Washington Ave., Madison, SD, USA, 57042

☎: 814.915.0664 ✉: alex.dececchi@dsu.edu

https://scholar.google.com/citations?user=tdl3nP4AAAAJ&hl=en

EDUCATION

PhD-Biology, 2005-2012

Faculty of Science, McGill University

- Thesis: Examining a major evolutionary transition: the origin of birds from non-avian theropods

Bachelor of Science (Honours) (B.Sc.H), Biology, 2001-2005

Faculty of Arts and Science, Queen's University

- Graduated on Dean's Honour Roll

POSTDOCTORAL EXPERIENCE

William E. White Postdoctoral Fellowship in Geological Sciences

Geological Sciences and Engineering, Queen's University, 2015-2017

- Investigating the phylogenetic relationship of the Ediacaran biota and its implication for the modern fauna.

Postdoctoral Researcher, Vertebrate Morphology and Bioinformatics

Department of Biology, University of South Dakota, 2012-2014

- Linking evolutionary and developmental phenotypes across the fin to limb transition using the Phenoscape knowledge base ontology system.

PROFESSIONAL EXPERIENCE

Assistant Professor, 2023-Present

Biology Department, Dakota State University

Assistant Professor, 2019-2023

Division of Natural Sciences Mount Marty University

- Developing and creating curriculum for teaching undergraduate students in the Biology, Health Sciences, Nursing, Kinesiology, and Pre-Med.
- Working on the development and implementation of a new biology curriculum to integrate more fully the Natural and Health Science departments.

- Working through committee and faculty senate pathways to increase visibility and promotion of Mount Marty as it transitions from a college to a university.
- Helping to raise awareness and develop research grant resources for faculty and staff.
- Mentoring students in course related issues and program selection, career development, academic achievements and independent research.
- Mentors students in course related issues and program selection.
- Supervises undergraduate theses.
- Serving on university wide committees including the Faculty Development Committee, the Education Committee, and the Teaching and Learning with Technology Committee.
- Taught undergraduate courses.

Assistant Professor, 2017-2019
Division of Natural Sciences University of Pittsburgh-Johnstown

- Member of the Organismal group of the Biology Department with a focus on comparative anatomy, evolution and paleoecology.
- Serving as representative for faculty on the National Honors Biology Society National Committee, the TRI BETA.
- Developed and taught courses in Biology supporting the Health Sciences departments.
- Developed and taught courses in Health Sciences programs.
- Developing and creating curriculum for teaching undergraduate students in the Health Sciences, Nursing, Kinesiology, and Pre-Med.
- Taught undergraduate courses.

Adjunct Lecturer
Queen's University, 2015-2016
Carleton University, 2015
University of South Dakota, 2014
University of Toronto (Mississauga), 2011

COURSES TAUGHT|

Dakota State University

Biology 153, General Biology II

- The follow up to General Biology I (Biology 151) focusing on organismal diversity, evolution and ecology.

Biology 221, Anatomy

- This course is an introduction to Human Anatomy and Histology. Includes lab section.

Biology 280, Inquiry and Analysis in Biology
- This course is designed to teach students foundational skills needed for success in upper level biology courses, research, and careers in the biological sciences. Includes lab section.

Biology 325, Physiology
- This course is an companion to Biology 221 but focused on Human Physiology and its biological consequences. Includes lab section.

Biology 335, Bioinformatics
- An introduction to the field of bioinformatics, the underlying principals and basic foundations and a tour of modern techniques and software used across the biological and medical sciences.

Biology 492, Special topics: Evolution
- Senior level course on evolution and natural selection.

University of South Dakota

Biology 105, Human Anatomy
- An introductory level course on the human organism taught on-line.

Mount Marty University

Biology 490, Senior Seminar
- Course designed to give the student an opportunity to carryout research or review of the literature on a topic of the student's choice.

Biology 330, Genetics
- This course offers an introduction to the principles of classical Mendelian genetics and the principles and techniques of modern molecular genetics. Includes lab section.

Biology 204, Anatomy and Physiology II
- This course is an introduction to Human Anatomy, Physiology and Histology. Includes lab section.

Biology 350, Vertebrate Comparative Anatomy
- This course is a Vertebrate Anatomy class. Includes lab section.

Biology 203, Anatomy and Physiology I
- This course is an introduction to Human Anatomy, Physiology and Histology. Includes lab section.

Biology 318, Evolution
- Senior level course on evolution and natural selection. Includes lab section.

Biology 106, Introduction to Life Science
- An introductory course for non-science majors.

University of Pittsburgh-Johnstown

Biology 0110, General Biology I
- An overview course teaching the fundamentals of biological. Required for all biology majors.

Biology 1515, General Ecology
- This course is an introduction to major concepts in Ecology.

Biology 0970, Anatomy and Physiology II
- This course is an introduction to Human Anatomy and Physiology.

Biology 1120, Vertebrate Anatomy
- This course emphasizing Human Anatomy but incorporating comparative methods, aimed at Biology majors and other students interested in advanced biology coursework. Includes lab section.

Biology 0080, Life Science
- This course is a biology course designed for non-science majors.

Biology 1280, Special Topics-Vertebrate Paleontology
- This course is designed to help students understand the basics of vertebrate palaeontology.

Queen's University

Geology 342, Vertebrate Paleontology
- Course on how to use fossil evidence. Includes lab section.

Biology 202, Diversity of Life II
- Lectured on the evolution of flight and the origins of birds.

Geology/Geological Engineering 301 Field studies in Geology I
- Directed a multi-day field trip.

Geology 107, History of Life
- Lectured on Evolution.

Geology 238, Surficial Processes, Sedimentation and Stratigraphy
- Lectured on the use of fossil in environmental and ecological reconstructions.

Geology 107, History of Life
- Lectured on evolution, classification of life.

Carleton University

Earth Sciences 3111, Vertebrate Paleontology I: Mammalian Paleontology and Evolution
- Course centered on the use of fossil evidence for studying the evolution of mammals. Includes lab section.

Earth Sciences 3112, Paleontology of Lower Vertebrates
- Course focused on non-mammalian vertebrate evolution and diversification since the Cambrian. Includes lab section.

University of South Dakota

Biology 441/541, Histology
- Course dealt primarily with mammalian (especially human) histology. Includes lab section.

Biology 573 Evolution, Graduate Seminars
- Lectured on Theropod allometry and the origin of birds.

Biology 151 General Biology
- Lectured on speciation and the fossil record.

Biology 792; Evolution and Development, Graduate Seminars
- Lectured on Fossil record of the fin to limb transition.

University of Toronto (Mississauga)

Biology 325, Functional Morphology of Animals
- Course was to teach students the form/ function relationship and how that has influence metazoan evolution. Includes lab section.

Biology 354, Vertebrate Form and Function
- Course objectives were to identify the major tissue systems and the evolutionary changes undergone throughout vertebrate phylogeny and development. Includes lab section.

DR. THOMAS ALEXANDER DECECCHI
| Phone: 814.915.0664| alex.dececchi@mountmarty.edu|

STUDENT SUPERVISION

Supervised twelve undergraduate theses
Examples are:

Brandt, E., Senior Seminar Project, *Mount Marty University*, 2022 (Supervisor)
- Project topic: Mindfulness and archery, a literature review.

Rofe, C., Senior Seminar Project, *Mount Marty University*, 2022 (Supervisor)
- Project topic: The effects of Spider Tact on pitching performance.

EDITORIAL EXPERIENCE

EDITORIAL EXPERIENCE

PLoS ONE (2019-present)
All Earth (2022-present)
- Recruiting reviewers based on expertise in the required disciplines
- Ensuring prompt, accurate, and appropriate responses.
- Evaluating reviewers' input to make determination on the merit of received manuscripts
- Making recommendations to senior administrators on acceptance, rejection, or modifications needed for publication of manuscripts.

PEER REVIEWED PUBLICATIONS

- Grimes, K.F., Narbonne, G.M., Gehling, J. G., Tressler, P. W. and **T.A. Dececchi.** 2023. *Elongate Ediacaran fronds from the Flinders Ranges, South Australia*. **Journal of Paleontology.** Published online 2023:1-17. doi:10.1017/jpa.2023.45

- Hone, D.W.E., **Dececchi, T.A.** and HCE Larsson. *Diverse diets in small theropods - the Cretaceous feathered dinosaur Microraptor zhaoianus ate mammals.* **Journal of Vertebrate Paleontology.** Published online December 20, 2022; doi: 10.1080/02724634.2022.2144337

- Pittman, M, Kaye, T.G., Wang, X., Zheng, X., **Dececchi, T.A.,** Navalon, G and S.A. Hartman. *Preserved soft Anatomy confirms shoulder-powered upstroke of early theropod flyers, reveals enhanced upstroke and explains sternum loss.* **Proceedings of the National Academy of Sciences of the United States of America.** 119 (47) e2205476119

- Gardnier, N.M and **T.A. Dececchi**, 2022. *Flight and echolocation evolved once in Chiroptera: comments on 'The evolution of flight in bats: a novel hypothesis.* **Mammal Review** https://doi.org/10.1111/mam.12286.

- Pittman, M. Habib, M.B., **Dececchi, T.A.**, Larsson, H.C.E., Pei, R., Kaye, T.G., Norell, M.A., Brusatte, S.L and Z. Xing. 2021. *Reply to Serrano and Chiappe.* **Current Biology**. 31(8): R372-R373.

- Pei, R., Pittman, M., Goloboff, P.A., **Dececchi, T.A.**, Norell, M.A., Kaye, T.G., Larsson, H.C.E., Habib, M.B., Brusatte, S.L., and X. Xu. 2020. *Potential for powered flight neared y most close avialan relatives, but few crossed its thresholds.* **Current Biology**. 30(20): 4033-4046.

- **Dececchi, T.A.,** Habib, M.B., Larsson, H.C.E., Roy, A., Kaye, T.G., Wang, X., Zheng, X. and X. Xu. and Pittman, M. 2020 *Aerodynamics show membranous-winged theropods were a poor gliding dead-end.* **IScience.** 101574.

- **Dececchi, T.A.**, Mloszewska, A.M., Habib, M.B., Larsson, H.C.E and T.H. Holtz. 2020. *The fast and the frugal: Using allometry and biomechanics to examine differential hunting strategies across theropod clades.* **PLoS One** 15(5): e0223698.

- **Dececchi, T.A.,** Larsson, H.C.E., Pittman, M. and Habib, M.B. *High flyer or high fashion?: A comparison of flight potential among small bodied paravians*. 2020. **Pennaraptoran theropod dinosaurs: past progress and new frontiers.** M. Pittman and X. Xu. New York, Bulletin of the American Museum of Natural History**:** 295-320.

- Pittman, M., Serrano, F., Field, D., Habib, M.B., **Dececchi, T.A.**, Kaye, T.G. and H.C.E. Larsson *Methods for studying early theropod flight.* 2020. **Proceedings of the International Pennaraptoran Dinosaur Symposium**. Eds. M. Pittman and X. Xu. Bulletin of the American Museum of Natural History: 277-294.

- Larsson, H.C.E., Habib, M.B., and T.A. **Dececchi, T.A.** 2020. *Navigating the functional landscapes: A bird's eye view of avian flight.* **Pennaraptoran theropod dinosaurs: past progress and new frontiers.** M. Pittman and X. Xu. New York, Bulletin of the American Museum of Natural History**:** 321-322.

- Burzynski, G., Narbonne, G.M., **Dececchi, T.A.,** and R.W. Dalrymple. 2020. *Cryogenian Aspidella from Northwestern Canada*. **Precambrian Research**. 336: doi.org/10.1016/j.precamres.2019.105507.

- Dahdul, W., Manda, P., Cui, H., Balhoff, J.P., **Dececchi, T.A.**, Ibrahim, N., Lapp, H., Vision, T., and P.M. Mabee. 2018. *Annotation of phenotypes using ontologies: a Gold Standard for the training and evaluation of natural language processing systems.* **Database**. 2018, bay110.

- **Dececchi, T.A.**, Narbonne, G.M., Greentree, C. and M. Laflamme. 2018. *Phylogenetic relationships among the Rangeomorpha: The importance of outgroup selection and implications for their diversification.* **Canadian Journal of Earth Sciences.** 55(11):1223-1239.

- Burzynski, G., Narbonne, G.M., **Dececchi, T.A.**, and R.W. Dalrymple. 2017. *The ins and outs of Ediacaran discs.* **Precambrian Research**. 300: 24-260**.**

- **Dececchi, T.A.**, Narbonne, G.M., Greentree, C. and M. Laflamme. 2017. *Relating Ediacaran Fronds*. **Paleobiology.** 43 (2): 171-180**.**

- **Dececchi, T.A.**, Larsson, H.C.E. and M.B. Habib. 2016. *The wings before the bird: an evaluation of flapping-based locomotory hypotheses in bird antecedents.* **Peerj.** 4:e2159.

- Carrillo-Briceno, J.D., Cadena, E.A., **Dececchi, T.A.**, Larsson, H.C.E. and T.Y Du. 2016. *First record of a hybodont shark (Chondrichthyes: Hybodontifrmes) from the Lower Cretaceous of Colombia.* **Neotropical Biodiversity.** 2(1): 81-86.

- **Dececchi, T.A.**, Mabee, P.M. and D. Blackburn. 2016. *Data Sources for Trait Databases: Comparing the Phenomic Content of Monographs and Evolutionary Matrices.* **PLoS One**. 11(5): e0155680.

- Cui, H., Dahdul, W., **Dececchi, T.A.**, Ibrahim, N., Mabee, P., Balhoff, J.P. and H. Gopalakrishnan. 2015 *CharaParser+EQ: Performance Evaluation without Gold Standard.* **Proceedings of the 78th ASIS&T Annual Meeting: Information Science with Impact: Research in and for the Community.** Article No. 20.

- **Dececchi, T.A.**, Balhoff, J.P., Lapp, H. and P.M. Mabee. 2015. *Towards synthesizing our knowledge of morphology: using ontologies and machine reasoning to extract presence/absence evolutionary phenotypes across studies*. **Systematic Biology.** 65(6): 936-952.

- Dahdul, W., **Dececchi, T.A.**, Ibrahim N, Lapp H and PM Mabee. 2015. *Moving the mountain: Analysis of the effort required to transform comparative anatomy into computable anatomy*. **Database** 2015: bay040.

- Deans, A.R. et al. 2015. *Finding our way through Phenotypes*. PLoS Biology. 13(1), e1002033.

- Balhoff, J.B., Dahdul, W.M., **Dececchi, T.A.**, Lapp, H., Mabee, P.M., and T. Vision. 2014. *Annotation of phenotypic diversity: decoupling data curation and ontology curation using Phenex.* **Journal of Biomedical Semantics**. 5:45.

- Balhoff, J.B., **Dececchi, T.A.**, Mabee, P.M., Lapp, H. 2014. *Presence-absence reasoning for evolutionary phenotypes*. Peer-reviewed conference paper, Bio-ontologies SIG at ISMB 2014.

- Haendel, M.A., Ballhoff, J.P., Bastian, F.B., Blackburn, D.C., Blake, J.A., Comte, A., Dahdul, W.A., **Dececchi, T.A.**, Druzinsky, R.E., Hayamizu, T.F., Ibrahim, N., Lewis, S.E., Mabee, P.M., Niknejad, A., Robinson-Rechavi, M., Sereno, P.C. snd C.J. Mungal. 2014. *Uberon: Unification of multi-species vertebrate anatomy ontologies for comparative biology***. Journal of Biomedical Science. 5(21)**.

- Siler, C.D., **Dececchi, T.A.**, Merkord, C.L., Davis, D.R., Christiani, T.J. and R.M. Brown. 2014. *Cryptic diversity and population genetic structure in the rare, endemic, forest-obligate, slender geckos of the Philippines.* **Molecular Phylogenetics and Evolution**. 70: 204-209.

- Midford, P.E.*, **Dececchi, T.A.***, Balhoff, J.P., Dahdul, W.M., Ibrahim, N., Lapp, H., Lundberg, J.G., Mabee, P.M., Sereno, P.C., Westerfield, M., Vision, T.J. and D.C. Blackburn. 2013. *The Vertebrate Taxonomy Ontology: A framework for reasoning across model organisms and species phenotypes***. Journal of Biomedical Science. 4(34)**.

- **Dececchi, T.A.** and HCE Larsson. 2013. *Body and limb size dissociation at the origin of birds: uncoupling allometric constraints across a macroevolutionary transition.* **Evolution. 67 (9): 2741-2752**.

- Maxwell. E.E. and **T.A. Dececchi**. 2013. *Ontogeny and stratigraphy influence observed phenotypic integration in the limb skeleton of a fossil tetrapod.* **Paleobiology.** 39 (1): 123-134.

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- Evans D., Vaverk, M.J., Bramen, D., Campione, N., **Dececchi, T.A.** and G Zazula. 2012. *Vertebrate fossils (Dinosauria) from the Bonnet Plume Formation, Yukon Territory, Canada.* **Canadian Journal of Earth Science.** 49(2): 396-411.

- **Dececchi, T.A.**, Larsson, H.C.E. and D.W.E. Hone. 2012.*Yixianosaurus longimanus (Theropoda: Dinosauria) and its bearing on the evolution of Maniraptora and ecology of the Yixian fauna.* **Vertebrata PalAsiatica.** 50(2): 111-139.

- **Dececchi, T.A.** and H.C.E. Larsson. 2011. *Assessing arboreal adaptations of bird antecedents: Testing the ecological setting of the origin of the avian flight stroke.* **PLoS One.** 6(8): e22292.

- **Dececchi, T.A.** and H.C.E. Larsson. 2009. *Patristic evolutionary rates suggest a punctuated pattern in forelimb evolution before and after the origin of birds.* **Paleobiology.** 35(1): 1-12.

***** *Denotes co-first author*

MANUSCRIPTS IN REVIEW|

- **Dececchi, T.A.**, Pittman, M., Kim, K.S., Lockley, M.G. Larsson, H.C.E, Farlow, J.O., Holtz, T.H. *Deinonychosaurian Feathered Dinosaur Trackway Provides Physical Evidence of Flapping-Assisted Locomotion.* In Review at **PNAS**.

- Pittman, M., **Dececchi, T.A.** and M. B. Habib. *Non-avialan Theropod Flyers were More Aerial Than Archaeopteryx, Highly Cursorial Short-ranged Flyer & Earliest Secondarily Flight-reduced Vertebrate*. In Review at **Communications Biology**.

PUBLISHED CONFERENCE PROCEEDINGS|

- **Dececchi, T.A.** 2023. *Future directions in the study of theropod flight origins.* 83rd Annual Meeting of the Society of Vertebrate Paleontology.

- **Dececchi, T.A.** and M. Pittman**.** 2021**.** *2nd* International Pennaraptoran Dionsaur Symposium (IPDS2): Theropod Flight Origins: Consensus, Contentions and Insights from Other Animal Groups Co-organisers and discussion leaders.

- **Dececchi, T.A.,** and N. Gardner. 2021 *On the wings of changes: modeling the origins of pterosaurs.* Northeast Natural History Conference

- **Dececchi, T.A.,** and N. Gardner. 2021. To the Sky and Back: The Natural History of flight and flightlessness. Special Session of the Northeast Natural History Conference. Co-organizer and session leader.

- **Dececchi, T.A.,** Bamforth, E. and H.C.E. Larsson. 2019. *Running on Empty: Investigating the energetics of theropod predators and Community Structure of the Latest Cretaceous Frenchman Formation Ecosystem*. Cretaceous and Beyond: Paleontology of the Western Interior.
.
- **Dececchi, T.A.** and B. Dececchi. 2019. *Active Learning Classrooms: Get Your Students Moving and Thinking*. Second annual Pittsburgh Regional Faculty Symposium.

- Mortimer, M., Cau, A., Gardner, N., **Dececchi, T.A.** and D. Marjanović. 2018. *Ornithoscelida, Phytodinosayria, Saurischa: Testing the effects of mis-scores in matrices in basal dinosaur phylogeny.* 78th Annual Meeting of the Society of Vertebrate Paleontology.

- **Dececchi, T.A.,** Habib, M.B. and H.C.E. Larsson. 2018. *Flights of fancy: Modeling powered flight versus gliding in the bizarre theropod Yi qi and its bearing on the question of the origin of flight across Pennaraptora*. 78th Annual Meeting of the Society of Vertebrate Paleontology.

- Lippincott, K.E., McIntosh, L.E., Larsson, H.C.E. and **T.A. Dececchi**. 2018. Do *epigenetics affect morphological characters and influence phylogenetic reconstructions in birds and non-avian dinosaurs.* 78th Annual Meeting of the Society of Vertebrate Paleontology.

- Pittman, M., Goloboff, P.A., **Dececchi, T.A**., Norell, M.A., Kaye, T.G., Larsson, H.C.E., Habib, M.B., Brusatte, S.L., & Xu, X. *Gradual build-up of powered flight potential among close avian relatives revealed by combing phylogenetic, aerodynamic, and anatomical data.* 78th Annual Meeting of the Society of Vertebrate Paleontology.

- Burzynski, G., Narbonne, G.M., **Dececchi, T.A.** and R.W. Dalrymple. 2018. *Cryogenian Aspidella from Northwestern Canada*. 131st Annual Meeting of the Geological Society of America Annual Meeting.

- **T.A. Dececchi**. 2018. *The use of aerodynamic modelling to unravel the effects of powered flapping on the origin of avian flight.* Conference on Bio-Propulsion of adaptive systems.

- Lippincott, K.E., McIntosh, L.E., Larsson, H.C.E. and **T.A. Dececchi**. 2018. *Epigenetic effects on morphological characters and its influence on phylogenetic reconstructions in birds and non-avian dinosaurs.* 6th Annual Conference of Canadian Society of Vertebrate Paleontology.

- **Dececchi, T.A**. 2018. *Dragons or flying squirrels: modeling the potential for powered flight versus gliding in the bizarre theropod Yi qi.* 6th Annual Conference of Canadian Society of Vertebrate Paleontology.

- **Dececchi, T.A.** Larsson, H.C.E and M.B. Habib. 2018. *Once, twice, three times ….maybe?: investigating the origins of flight potential within maniraptoran theropods.* International Pennaraptoran Dinosaur Symposium.

- **Dececchi, T.A.**, Greentree, C. and G.M. Narbonne. 2017. *Who are you?: Investigating the phylogenetic relationships among bilateral Ediacaran taxa.* 130th Annual Meeting of the Geological Society of America Annual Meeting.

- **Dececchi, T.A**. 2017. An arm and a leg: what the limbs can tell us about the ecology of the origin of flight. 1st Annual Three Rivers Evolution Event.

- Handyside, E., Tapscott, M., Narbonne, G.M., Tahara, R., Larsson, H.C.E and **T.A. Dececchi.** 2017. *Amber and Ambiguity: A lizard's tale.* 77th Annual Meeting of the Society of Vertebrate Paleontology.

- Peters, S., Habib, M., Sheppard, K., Rival, D. and **T.A. Dececchi.** 2017. It's all in the wrist….or is it: The use of aerodynamic modeling to unravel the origins of avian flight. 77th Annual Meeting of the Society of Vertebrate Paleontology.

- **Dececchi, T.A.**, Narbonne, G.M., Laflamme, M. and C. Greentree. *Relating Ediacaran fronds.* Geological Association of Canada-Mineralogical association of Mineralogy Annual Meeting.

- Burzynski, G., Narbonne, G.M., **Dececchi, T.A.** and R.W. Dalrymple. *The ins and outs of Ediacaran discs.* Geological Association of Canada-Mineralogical association of Mineralogy Annual Meeting.

- Peters, S., Habib, M.B., Sheppard, K., Rival, D. and **T.A. Dececchi.** 2017. *A wish for wings that work: The use of aerodynamic modelling to unravel the origins of avian flight.* Geological Association of Canada-Mineralogical association of Mineralogy Annual Meeting.

- Tapscott, M., Handyside, E., Narbonne, G.M., Keyser, K., Tahara, R., Larsson, H.C.E and **T.A. Dececchi.** 2017. *Unknown knowns: A multidiscipline approach investigation previously unknown amber samples and their paleo-ecological implications.* Geological Association of Canada-Mineralogical association of Mineralogy Annual Meeting.

- **Dececchi, T.A.**, Narbonne, G.M., Laflamme, M. and C. Greentree. *Relating Ediacaran fronds.* International Symposium on the Ediacaran-Cambrian Transition 2017.

- Burzynski, G., Narbonne, G.M., **Dececchi, T.A.** and R.W. Dalrymple. *The ins and outs of Ediacaran discs.* International Symposium on the Ediacaran-Cambrian Transition 2017.

- **Dececchi, T.A.**, Narbonne, G.M., Laflamme, M. and C. Greentree. 2016. *Relating Ediacaran fronds.* 129th Annual Meeting of the Geological Society of America Annual Meeting.

- Habib, M.B., Larsson, H.C.E., Dufault, D. and **T.A. Dececchi**. 2016. *Up, Up, and away: An analysis of terrestrial launching in theropods.* 76th Annual Meeting of the Society of Vertebrate Paleontology.

- **Dececchi, T.A.**, Habib, M.B., Larsson, H.C.E and T.H. Holtz. *Not so fast: a re-evaluation of cursoriality in theropods.* 76th Annual Meeting of the Society of Vertebrate Paleontology.

- **Dececchi, T.A.**, Larsson, H.C.E. and M.B. Habib. 2016. *Up, Up, and away: An analysis of terrestrial launching in theropods.* 4th annual Canadian Society of Vertebrate Paleontology. Abstract published in: **Vertebrate Anatomy Morphology Paleontology** (2).

- Balhoff, J.P., **Dececchi, T.A.**, Mabee, P.M. and H. Lapp. 2014. *Presence-absence reasoning for evolutionary phenotypes.* ISMB (Intelligent Systems for Molecular Biology).

- Mabee, P.M., **Dececchi, T.A.**, and D. Blackburn. 2014. *Matrix versus monograph: Comparison of phenotypic richness across data sources.* 74th Annual Meeting of the Society of Vertebrate Paleontology.

- Balhoff, J.P., **Dececchi, T.A.,** Lapp, H. and P.M. Mabee. 2014. *Synthetic morphological super-matrices: revealing unknown knowns and reducing missing data*. Evolution meeting.

- Dahdul, W., **Dececchi, T.A.**, Ibrahim, N., Lapp, H. and P.M. Mabee. 2014. *Moving the mountain: How to transform comparative anatomy into computable anatomy?* Evolution meeting.

- **Dececchi, T.A.,** Mabee, P.M. and J.B. Balhoff. *The modern character synthesis: Using semantic tools to aggregate morphological characters across studies.* Annual Meeting of the American Association of Anatomists at Experimental Biology 2014 (Invited Speaker).

- **Dececchi, T.A.**, Hall, J. and M. Habib. *Creating testing regimes for terrestrial origins of the avian flight stroke*. Annual Meeting of the American Association of Anatomists at Experimental Biology 2014.

- Balhoff, J.P., **Dececchi, T.A.**, Mabee, P.M. and H. Lapp. 2013. *Semantic tools for aggregation of morphological characters across studies.* Annual conference of the Taxonomic Database Working Group.

- **Dececchi, T.A.**, Habib, M.B. and H.C.E. Larsson. 2013. *Testing Wing Assisted Incline Running (W.A.I.R): Investigating the terrestrial origin of the avian flight stroke.* 73rd Annual Meeting of the Society of Vertebrate Paleontology.

- Mabee, P.M., **Dececchi, T.A.,** Ibrahim, N., Sereno, P.C. and J.P. Balhoff. 2013. *Aggregation of morphological characters across studies using an ontology-based phenotype approach.* 73rd Annual Meeting of the Society of Vertebrate Paleontology.

- Sears, K.E., **Dececchi, T.A.**, and P.M. Mabee. *Evolution of appendage modularity during the fin to limb transition*. 2013. 73rd Annual Meeting of the Society of Vertebrate Paleontology.

- Mungall, C.J., Balhoff, P.J, Bastian, F., Blackburn, D., Comte, A., Dahdul, W., **Dececchi, T.A.,** Ibrahim, N., Lewis, S.E., Mabee, P.M., Niknejad, A. and M.A. Haendel. 2013. *A merger of multispecies anatomy ontologies*. Biocuration Conference.

- **Dececchi, T.A**. 2012. *Patterns and processes at the origin of birds: Macroevolutionary tempo and mode*. 72nd Annual Meeting of the Society of Vertebrate Paleontology. Abstract published in **Journal of Vertebrate Paleontology.** 32(5): 82.

- **Dececchi, T.A.** and H.C.E Larsson. 2011. *The origin of wings*. 71st Annual Meeting of the Society of Vertebrate Paleontology. Abstract published in: **Journal of Vertebrate Paleontology.** 31(supplemental 2).

- Larsson, H.C.E., **Dececchi, T.A.** and LB Harrison. 2011. *Integrating the genotype-phenotype map across the origin of bird wings*. 71st Annual Meeting of the Society of Vertebrate Paleontology. Abstract published in: **Journal of Vertebrate Paleontology.** 31(supplemental 2).

- Larsson, H.C.E., **Dececchi, T.A.** and FC Montelfeltro. 2011. *A New Metiorhychid (Crocodyliformes, Thalattosuchia) from the Early Cretaceous of Colombia (Rosablanco Formation, Late Valanginian).* IV Latin American Congress of Vertebrate Paleontology. Abstract published in **Ameghianiana** 48 (4R): R86.

- **Dececchi, T.A.**, Montelfeltro F.C., and H.C.E. Larsson. 2011. *The morphological diversity of Crocodyliformes.* IV Latin American Congress of Vertebrate Paleontology. Abstract published in **Ameghianiana** 48 (4R): R82.

- Wilson L. and **T.A. Dececchi**. 2010. *A survey of bone microstructure in theropod forelimbs with regards to function.* 70th Annual Meeting of the Society of Vertebrate Paleontology. Abstract published in: **Journal of Vertebrate Paleontology**. 30(3): 32A.

- **Dececchi, T.A.,** Hone D., Larsson, H.C.E., Sullivan C. and X. Xu. 2010. *A re-analysis of the "Coelurosaurian pit-bull" Yixianosaurus longimanus with implications for the theropod dinosaur diversity of the Jehol Biota*. 70th Annual Meeting of the Society of Vertebrate Paleontology. Abstract published in: **Journal of Vertebrate Paleontology**. 30(3): 38A.

- Larsson, H.C.E., **Dececchi, T.A.**, Hone D., Sullivan C., and X. Xu. 2010. *The four-winged non-avian dinosaur Microraptor fed on mammals: Implications for the Jehol Biota Ecosystem.* 70th Annual Meeting of the Society of Vertebrate Paleontology. Abstract published in: **Journal of Vertebrate Paleontology**. 30(3): 39A.

- Dececchi, T.A. and H.C.E. Larsson. 2010. *Morphological rates of change in the theropod forelimb: Patterns and implications.* **3rd International Paleontological Congress**. London, June 28-July 3, 2010.

- Larsson, H.C.E., **Dececchi, T.A.** and L.B. Harrison. 2010. *Clocking Morphology: Estimating ancient divergence times and absolute rates of morphological evolution.* *3rd* **International Paleontological Congress**. London, June 28-July 3, 2010.

- Larsson, H.C.E. and **Dececchi, T.A**. 2009. *Estimating rates of morphological evolution: Large datasets begin to fit neutral models and give time to "morphological clocks.* 69th Annual Meeting of the Society of Vertebrate Paleontology. Abstract published in: **Journal of Vertebrate Paleontology**. 29 (3): 30A.

- **Dececchi, T.A.**, Harrison L.B. and H.C.E. Larsson. 2009. *Up in arms: An analysis of evolutionary trend within the Maniraptoran appendicular skeleton using allometric and Bayesian phylogenetic approaches.* 69th Annual Meeting of the Society of Vertebrate Paleontology. Abstract published in: **Journal of Vertebrate Paleontology**. 29 (3): 41A.

- **Dececchi, T.A.** and H.C.E. Larsson. 2009. *Origin of avian powered flight: evolution of body mass and wing skeletal allometry.* Frenchman Formation Terrestrial Ecosystems Conference, Eastend Saskatchewan, 17-19 May 2009.

- **Dececchi, T.A.** and H.C.E. Larsson. 2009. *Skeletal allometries about the theropod-bird transition.* (Latin American Vertebrate Paleontology Conference, Neuquen, Argentina, 22-25 September 2009.

- **Dececchi, T.A.** and H.C.E. Larsson. 2008. *A critical analysis of arboreality in Maniraptoran theropods*. 68th Annual Meeting of the Society of Vertebrate Paleontology Abstract published in: **Journal of Vertebrate Paleontology**. 28 (3): 18A.

- **Dececchi, T.A.** 2007. *Tempos and modes in Theropod evolution.* 67th Annual Meeting of the Society of Vertebrate Paleontology. Abstract published in: **Journal of Vertebrate Paleontology**. 27(3) : 67A.

- Larsson, H.C.E., de Boef M, **Dececchi, T.A.**, Harrison L.B., Rybczynski N. and L. Wilson. 2007. *Insight in the Cenomanian (Late Cretaceous) terrestrial and marine vertebrate fauna of Bylot Island, Nunavut.* 17th Canadian Paleontology Conference, St. John's.

- **Dececchi, T.A.** and H.C.E. Larsson. 2006. *Evolutionary trends in theropod forelimb evolution.* 66th Annual Meeting of the Society of Vertebrate Paleontology. Abstract published in: **Journal of Vertebrate Paleontology**.26 (3): 55A.

- **Dececchi, T.A.** and H.C.E. Larsson. 2006. *Forelimb evolution in theropods (Dinosauria) and its implication for avian origins.* Canadian Society of Zoologist annual meeting, Edmonton, 2006, abstract volume pg.36.

- **Dececchi, T.A.** and H.C.E. Larsson. 2006. *Off the beaten path: comparing evolutionary trajectories of different theropod clades.* 16th Canadian Paleontology Conference, Montreal.

- Larsson H.C.E. de Boef, M., **Dececchi, T.A.,** Maxwell, E., Tissandier, S. and M.J. Vaverk. 2006. *Marine reptiles from Melville and Cameron islands, Nunavut.* 16th Canadian Paleontology Conference, Montreal.

AWARDS AND HONOURS|

- 2018: The Mentorship Fund to Support Faculty-Student Scholarship, Research and Creative Activities, Funding Agency: University of Pittsburgh at Johnstown
- 2015-2017: William E. White Postdoctoral Fellowship in Geological Sciences, Funding Agency: Queens University
- 2008-2010: Doctoral Research funding, Fonds de Recherche et Technologies, Funding Agency: Province of Quebec
- 2010: Delise Allison Graduate travel award, Funding Agency: McGill University
- 2009: Northern Scientific Training Program, Funding Agency: Canadian Government
- 2007: Northern Scientific Training Program, Funding Agency: Canadian Government
- 2006: Northern Scientific Training Program, Funding Agency: Canadian Government
- 2001: John B. Sampson Award, Funding Agency: Queen's University

INVITED TALKS|

- Co-Chair of the 2nd International Pennaraptoran Dinosaur Symposium online conference March 17-20th 2023
- Co-Chair of upcoming Sixth International Paleontological Conference in Thailand November 2022
- January 2022-University of South Dakota- Biology Department
- November 2021-Mississippi Valley Field Naturalist
- October 2020- University of Toronto Mississauga -Biology Department
- March 2018- International Pennaraptoran Dinosaur Symposium (Hong Kong)

- March 2018-Northern Alleghenies Geological Society
- February 2017-Kingston Field Naturalists.
- September 2016-Queen's University.
- June 2016-Augustana University (Sioux Falls).
- November 2015-Los Angeles County Natural History Museum.

SELECT MEDIA APPEARANCES

- January 2023- Interview with local and regional news outlets on feeding biology in dinosaurs
- September 2021-Interview with CNN on animal flight
- October 2020- Interviews with New York Times, Popular Science, The Economist on research into early flight
- May 2020- Interviews with the New York Times on research into animal locomotion

PUBLIC OUTREACH|

- August 2004-Interviewed by CBC on paleobiology of Ediacaran organisms
- February 2009-11- Darwin Day Volunteer at McGill University
- March 2010- Outreach to elementary school students teaching evolution
- December 2013- Outreach to elementary school students teaching about dinosaurs
- February 2016- Outreach to elementary school students on Canadian dinosaur diversity
- July 2016-Press interview for local paper (Kingston Whig Standard) on origins of flight
- October 2019- Outreach to high school students for Mount Marty's Women in Science Day, taught evolution, and history of life
- October 2020- Outreach elementary school students on dinosaurs
- October 2020- Judged student's virtual poster competition for the Paleontological Society
- November 2021- Talk to Mississippi Valley Field Naturalist (Ottawa regional branch)
- July 2022-Skype a Scientist with the Tampa Museum of Science and Industry

FIELD WORK|

- Bonavista Peninsula, Newfoundland, Canada, June 2017
- Bonavista Peninsula and Mistaken Point, Newfoundland, Canada, August 2015
- Flinders Ranges, Australia, May 2015
- Harding County, South Dakota, USA, May 2014
- Zapatoca Region, Colombia, May 2013
- Milk River, Alberta, Canada, July 2011
- Wind River, Yukon, Canada, August 2009
- East End and Grassland National Park, Saskatchewan, Canada, May 2009

- Zapatoca Region, Colombia, September 2008
- East End and Grassland National Park, Saskatchewan, Canada, May 2008
- Bylot Island, Nunavut, Canada, June-July 2007
- East End and Grassland National Park, Saskatchewan, Canada, May 2006
- Ellesmere Island, Melville Island, Nunavut, Canada, June-July 2006
- Dry Island National Park, Alberta, Canada, August 2005

MEMBERSHIPS AND AFFILIATIONS |

- Geological Society of America: Geobiology and Geomicrobiology division
- Society of Vertebrate Paleontology
- Canadian Society of Vertebrate Paleontology
- Paleobiology Database
- Canadian Society for Ecology and Evolution
- Taxonomic Database Working Group
- Phenotype Research Coordination Network

PROFESSIONAL DEVELOPMENT WORKSHOPS ATTENDED |

- Academic Integrity
- Advising as Teaching
- Advising Approaches
- PeopleSoft and Advising
- Health, Counseling, Disabilities and Special Student Populations
- Billing, Financial Aid, and Academic Policies
- Career Services, Real World Action Program, Student Life, and Student Conduct

REAGAN SCHAEFFER

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EDUCATION

M.S. in Biological Sciences | South Dakota State University
AUGUST 2021 – DECEMBER 2023
GPA 3.531/4.0

Bachelor of Science in Biotechnology | James Madison University
AUGUST 2019 – DECEMBER 2020
GPA 3.478/4.0

Associate of Science in Science | Piedmont Virginia Community College
MAY 2018 – MAY 2019
GPA 3.533/4.0; Cum Laude

Certificate in General Education | Piedmont Virginia Community College
MAY 2018 – MAY 2019
GPA 3.556/4.0; Cum Laude

RESEARCH INTERESTS

- Microbiology
- Food Safety
- Biochemistry
- Bacteriophages
- Biodefense
- Environmental Microbiology

RESEARCH EXPERIENCE

Graduate Research Project | South Dakota State University
JANUARY 2022 – MAY 2023; PI: Dr. Bishnu Karki
Conduct research in oilseed conversion, fermentation, and glyceollin evaluation. Current studies involve sunflower waste bioconversion to produce high-value products such as mushrooms; soybeans and glyceollin production, as well as camelina meal fermentation composition evaluation (proteins, fiber, sterols, etc.).

Graduate Research Assistant | South Dakota State University
AUGUST 2021 – DECEMBER 2021; PI: Dr. Benjamin Hause
Conduct research in the continual screening of bovine, porcine, and wildlife samples for coronaviruses, as well as further characterization and analysis of alphacoronavirus found in bats submitted to SDSU Animal Disease Research and Diagnostic Laboratory (ADRDL) for rabies testing. Research conducted in Biosafety Level 3 (BSL-3) laboratory. Techniques implemented include RNA extraction, pan-CoV nested PCR, viral isolation, hemagglutination assay, cell culture, viral isolation, gel electrophoresis, gel PCR cleanup and purification, metagenomic sequencing, and Sanger sequencing preparation.

LFFM Research Assistant | West Virginia Department of Agriculture
MARCH 2021 – APRIL 2021; PI: Ms. Megan Young
Assisted the WVDA research scientist with the FDA Laboratory Flexible Funding Model (LFFM) grant. Items that were tested include commercial and non-commercial dry and wet dog food, dry and wet cat food, dog treats, horse treats, as well as strictly commercial baby food, dry cereal, and dry granola. Using FDA-approved methods for *E. coli* and *Salmonella* testing, items were cultured and ct values obtained through PCR. Positive samples were reported to the FDA.

Undergraduate Research Assistant | James Madison University

JANUARY 2020 – DECEMER 2020; PI: Dr. Steven Cresawn

Conducted research in the continual development of Phamerator.org, a web-based comparative genomics and genome exploration tool. This database stores both PhagesDB.org and GenesDB.org data, which serves the SEA-PHAGES and SEA-GENES projects at JMU. Platforms implemented include HTML, JavaScript, Python, CSS, D3.js, and MongoDB.

Undergraduate Research Course Project | James Madison University

AUGUST 2019 – DECEMBER 2019; PI: Dr. Steven Cresawn

Assessed and isolated soil samples acquired from a local arboretum for bacteriophages that kill *Mycobacterium smegmatis* mc^2155. A phage isolate was purified and amplified, with a resultant high titer lysate and DNA extraction of phage isolate.

Undergraduate Research Course Project | James Madison University

NOVEMBER 2019 – DECEMBER 2019; PI: Dr. Christopher Berndsen

Collaborated in the synthesis of a research paper from a compilation of peer-reviewed literature to analyze the genetic relatedness of beta-amylase derived from rice relative to an *Arabidopsis thaliana* origin.

Independent Research Project | Piedmont Virginia Community College (PVCC)

AUGUST 2018 – DECEMBER 2018; PI: Dr. Frances Rees

Collected and assessed soil samples for mercury contamination from South River upstream and downstream of large manufacturing facility located in Waynesboro, VA. Detected no evident mercury contamination of upstream soil, while mercury levels of 0.003-0.05 ppm were detected downstream of a manufacturing plant.

PUBLICATIONS

- Schaeffer R, Temeeyasen G, Hause BM. Alphacoronaviruses Are Common in Bats in the Upper Midwestern United States. *Viruses.* 2022; 14(2):184. https://doi.org/10.3390/v14020184

PRESENTATIONS

"Mercury in the South River, Waynesboro, Virginia" | PVCC

DECEMBER 7, 2018

Presented the conclusions of mercury contamination of soil at a college-wide science presentation.

WORK EXPERIENCE

Science Lab Manager | Dakota State University

NOVEMBER 2023 – CURRENT

Perform daily lab prep, upkeep, and maintenance for the teaching labs at Dakota State University. Develop curriculum and teach General Biology 1&2 Labs, Survey of Biology 1&2 labs, proctor and fill in for other courses. Oversee and train student workers and researchers. Maintain inventory, order supplies, develop safety plans and protocols for the labs, dispose of chemicals and supplies, perform general lab equipment maintenance, and other tasks to keep the labs running and in good condition as needed.

Quality Control Associate Scientist | Medgene Labs, LLC

JUNE 2023 – NOVEMBER 2023

Perform daily quality control analysis of samples required for vaccine production. Analyses include western blot, sterility, immunofluorescence, flow cytometry, and mice safety testing. Maintain inventory, logged samples, upkeep labs, and follow USDA and CVB testing techniques and certifications.

Graduate Teaching Assistant | South Dakota State University, Biology Department

JANUARY 2022 – MAY 2023

Was responsible for instructing BIOL 101, Survey of Biology 1 labs, MICR 231L General Microbiology labs, as well as assisting with BIOL 151L and BIOL 153L, General Biology 1 and 2 labs. Responsibilities included instructing BIOL 101L + MICR 231L in person, as well as grading and developing homework and quiz questions for all courses listed.

Graduate Research Assistant | South Dakota State University, ADRDL

AUGUST 2021 – DECEMBER 2021

Conducted research in the screening of bovine, porcine, and wildlife samples for coronaviruses, as well as the identification and characterization of novel alphacoronaviruses in bats submitted to the SDSU ADRDL for rabies testing. Techniques used include PCR assay, viral isolation, BSL-3 laboratory, and metagenomic sequencing.

Research Assistant | South Dakota State University, ADRDL

MAY 2021 – AUGUST 2021

Conducted research in the screening of bovine, porcine, and wildlife samples for coronaviruses, as well as the identification and characterization of novel alphacoronaviruses in bats submitted to the SDSU ADRDL for rabies testing. Techniques used include the designing of a pan-CoV PCR assay, viral isolation, BSL-3 laboratory training, and metagenomic sequencing.

Microbiologist 1 | West Virginia Department of Agriculture, READ Division

MARCH 2021 – APRIL 2021 (INTERVIEWED JANUARY 2021)

In charge of testing beef samples, environmental swabs, carcass sponges, and other meat samples (including ready to eat) for bacteria, including but not limited to, the Big 6, *E. coli, Salmonella, Campylobacter jejuni, Listeria spp.,* and *Listeria monocytogenes.* In charge of creating media for plates and tubes, creating an autoclave/dishwashing schedule, maintaining inventory for the entire microbiology laboratory, recordkeeping for the samples, destroying samples after results were obtained, and calling and reporting the results to the West Virginia Meat and Poultry Inspection Division. Trained and certified by the WVDA in both USDA and FDA testing techniques for the above bacteria. Assisted the WVDA research scientist with the FDA Laboratory Flexible Funding Model (LFFM) grant. Items tested for *E. coli* and *Salmonella* include dry and wet dog food, dry and wet cat food, dog treats, horse treats, baby food, dry cereal, and dry granola. Equipment used include: stomacher, autoclave, incubators, BioRad PCR machine, BAX PCR machine, Laboratory Information Management System (USA LIMS), Vitek2, and 3M Petri films.

Microbiology Lab Intern | West Virginia Department of Agriculture, READ Division

JANUARY 2021 – MARCH 2021

Completed daily quality control, including testing both MilliQ and E-pure water purification systems for pH and conductivity, calibrating balances, as well as recording temperatures for all freezers, refrigerators, incubators, and waterbaths in use. Assisted with testing of beef samples, environmental swabs, carcass sponges, and other meat samples (including ready-to-eat) for bacteria, including but not limited to, the Big 6, *E. coli, Salmonella, Campylobacter jejuni, Listeria spp.,* and *Listeria monocytogenes.* Assisted with logging new samples into the Laboratory Information Management System for the state of West Virginia, creating media for plates and tubes, running the autoclave, cleaning glassware, and recordkeeping for the samples during testing. Trained and certified by the WVDA in both USDA and FDA testing techniques for the above bacteria. Equipment used include: pH meter, conductivity meter, autoclave, incubators, BioRad PCR machine, BAX PCR machine, Laboratory Information Management System (USA LIMS), Vitek2, and 3M Petri films.

PASS Leader and Teaching Assistant | James Madison University, Biology Department

AUGUST 2020 – DECEMBER 2020

Served as a Teaching Assistant and Peer Assisted Study Sessions leader for an undergraduate microbiology course. Office hours and review sessions were held weekly outside of class times. Responsible for grading and developing homework and quiz questions.

Research Assistant 1 | James Madison University, Biology Department

JUNE 2020 – AUGUST 2020

Conducted research in the continual development of Phamerator.org, a web-based comparative genomics and genome exploration tool. This database stores both PhagesDB.org and GenesDB.org data, which serves the SEA-PHAGES and SEA-GENES projects at JMU. Platforms include HTML, JavaScript, Python, CSS, D3.js, and MongoDB.

SKILLS & SOFTWARE

Mendeley Desktop | Intermediate
YASARA | Intermediate
Laboratory Information Management System (USA LIMS) | Intermediate
Laboratory Information Management System (USA PLANTS) | Basic
SnapGene | Basic
MegaX | Basic
CLC Genomics | Basic
ObservableHQ | Basic
LabQest/Vernier Software | Basic
Recombination Detection Program v.5 | Basic
A Plasmid Editor (ApE) | Basic
Clone Manager | Basic
IBM SPSS software | Basic

EQUIPMENT

- BioRad PCR machine
- DuPont BAX PCR machine
- Thermal cycler
- Stomacher
- Various pipettes
- BSL-3 Laboratory
- Vitek2
- Autoclave
- MilliQ water system
- E-pure water system
- Basic lab equipment (balances, hotplates, etc.)
- pH and conductivity meter

AWARDS, HONORS, & CERTIFICATES

Biotechnology Certificate | South Dakota State University
DECEMBER 2023
Professional Development Program Certificate | South Dakota State University
APRIL 27, 2022
Introduction to Incident Command System Certificate | FEMA
JANUARY 4, 2021
An Introduction to the National Incident Management System Certificate | FEMA
JANUARY 4, 2021
President's List, 2020 Spring Semester | James Madison University
MAY 2020
Awarded in recognition of earning a semester GPA of 3.9 or higher.
Fundamentals Course for Radiological Response Certificate | FEMA
MARCH 30, 2020
Hospital Emergency Dept. Management of Radiation Accidents Certificate | FEMA
MARCH 26, 2020
Jean D. Acton Scholarship Recipient | James Madison University
MARCH 25, 2020
Awarded in recognition of being an outstanding full-time undergraduate student, who conducts research in either microbiology or immunology in the Biology Department.

Standardized Awareness Training Program Certificate | FEMA
FEBRUARY 6, 2020
Virginia 4-H All Star | Virginia 4-H
JUNE 2018 (TAPPED)
Honors Recipient | Eta Sigma Alpha Honor Society
AUGUST 2017 – MAY 2018
The President's Golden Volunteer Service Award | Corp. for National & Community Service
AUGUST 2015 – MAY 2017 (TWO GOLD AWARDS)
District 4-H Presentation & Share-the-Fun Awards | Virginia Northern District 4-H
FEBRUARY 2014 (TWO BEST IN SHOW AND BLUE RIBBON AWARDS)
County 4-H Presentation & Share-the-Fun Awards | Virginia Augusta County 4-H
FEBRUARY 2014 – FEBRUARY 2015 (ONE BEST IN SHOW AND THREE BLUE RIBBON AWARDS)

RELEVANT COURSEWORK

- Biochemistry I (with lab)
- Advanced Molecular Biology
- Environmental Microbiology
- Bioinformatics
- Genetics
- Calculus I & II
- Virology
- Bioprocessing

LEADERSHIP

Graduate Teacher's Assistant | South Dakota State University
JANUARY 2022 – MAY 2023
Microbiology Undergraduate Teacher's Assistant | James Madison University
AUGUST 2020 – DECEMBER 2020
Associate Level 1 Shotgun Shooting Sports Instructor | Virginia 4-H
CERTIFIED OCTOBER 2019
Associate Level 1 Archery Shooting Sports Instructor | Virginia 4-H
CERTIFIED OCTOBER 2018
President | Augusta Archers 4-H Club
OCTOBER 2017 – OCTOBER 2019 (TWO CONSECUTIVE TERMS)