



UNIVERSITY OF COLORADO DENVER  
DEPARTMENT OF INTEGRATIVE BIOLOGY



## GRADUATE STUDENT HANDBOOK



**2022-23 ACADEMIC YEAR**

NOTE: This handbook is a supplement to the University of Colorado Denver | Anschutz Medical Campus Graduate School Student Handbook which can be found on the Graduate School's website. Students, advisors, and committee members are responsible for knowing the procedures, policies, and requirements outlined here and in the Graduate School Policy and Procedures documents ([link](#)).

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## **INTRODUCTION**

The graduate program in Biology is a research-based program designed for students with interests in any of a broad range of basic science subjects including molecular, cellular, behavioral, evolutionary, ecological, or wildlife population biology. The Program is administered by the Department of Integrative Biology and the Graduate School at the University of Colorado Denver and offers a Master's of Science (MS) program in Biology and a doctoral (PhD) program in Integrative and Systems Biology. The program consists of nearly 50 faculty members from 16 different departments and partnering organizations, and approximately 50 graduate students.

Program inquiries should be directed to:

Graduate Programs in Biology  
Department of Integrative Biology  
University of Colorado Denver  
Campus Box 171  
P.O. Box 173364  
Denver, CO 80217-3364

Web page: <http://clas.ucdenver.edu/biology/grad.html>

Graduate Program Coordinator: Molly R. O'Connor  
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Graduate Program Director: Dr. Brian Buma  
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## **Program Goals & Philosophy**

Graduate training in Biology at the University of Colorado Denver is intended to prepare students to become critical problem solvers who are qualified to address biology-related issues at national and international levels. The program philosophy recognizes science not as a collection of facts, but rather as a process designed to help make informed decisions about the nature of evidence; scientific methods are used to guide decisions about hypotheses. The program is designed to equip students with the background necessary to generate new ideas and to participate in scientific debates, both academically and publicly. Therefore, the goal is to provide advanced training in the current concepts, theories, debates, and methods for modern biology from a curriculum that emphasizes critical thinking and communication through a series of seminars and research-oriented courses that are specifically tailored to student research programs.

### Nature of Programs

The graduate programs in biology are research-based and provide an opportunity for instruction and mentorship from world-class faculty studying both basic and applied problems in biology. Faculty advisors for the programs are from the Departments of Integrative Biology, Anthropology, Biochemistry, Biostatistics, Cell and Developmental Biology, Chemistry, Civil Engineering, Craniofacial Biology, Geography, Mathematics, Pharmacology, Physics, Physiology, and Psychology; additional faculty advisors are affiliated with the Denver Museum of Nature & Science and the Denver Botanic Gardens.

There is a strong culture of mentorship shared by faculty in the Department of Integrative Biology. This provides the unique opportunity for close collaboration and for high quality individually directed mentoring by advisors and advisory committees. The programs include a number of formal and informal activities designed to promote a strong sense of community among graduate students on campus.

### Resources and Facilities

The campus is located in downtown Denver, one of America's most vibrant cities. The heart of downtown is the 16th Street Mall; a mile-long pedestrian zone lined with outdoor cafes, restaurants and retail shops. Shuttle buses provide free transportation on the mall, and the surrounding suburbs and Denver International Airport are linked by light rail. The Denver Performing Arts Complex and Theatre District is just across the street from campus and features live entertainment available nightly. LoDo, Denver's hip historic district, is also a short walk from campus and boasts more than 90 brew pubs, sports bars and music clubs. Denver is situated between the Great Plains and the Rocky Mountains; there are many opportunities for outdoor recreation and there are over 300 days of sunshine per year.

The Downtown and Anschutz Medical campuses at CU Denver provide a wide range of resources for research. Facilities for the Department of Integrative Biology were constructed in 2010 and include an AAALAC accredited animal holding facility, core molecular and ecological laboratories, two greenhouses, growth chamber rooms, a cold room, an imaging room, a dark room, a shared instrumentation room, as well as storage and access to cluster computing.

Facilities at the Anschutz Medical Campus in Aurora include core facilities for microscopy, imaging, biophysics, genetic sequencing, flow cytometry, histology, NMR, biochemistry, proteomics, and genomics computational facilities.

The greater Denver metro area is home to headquarters for a range of federal agencies including the U.S. Geological Survey, U.S. Fish and Wildlife Service, U.S. Forest Service, Bureau of Land Management, Environmental Protection Agency, Bureau of Reclamation, and the U.S. Renewable Energy Laboratory. The state office for Colorado Parks and Wildlife is in Denver and local non-profits include the Denver Zoo, Denver Museum of Nature & Science, and the Denver Botanic Gardens. Denver is also a hub for private biotechnology firms and is home to several nationally ranked hospitals and diverse ecological environments.

## ADMISSIONS STANDARDS

### MS Program in Biology

- A BA/BS from an accredited institution awarded within the last 10 years (validation of current content may be required)
- Minimum undergraduate GPA: 3.0
- TOEFL: required for international applicants from countries in which English is not the official language
- 3 letters of recommendation
- Official transcripts from all attended institutions
- A letter of support from your identified faculty mentor prior to application. Students are required to contact faculty in advance. Prior to application, applicants must have identified and contacted an available Faculty Advisor (see list on page 14) to ensure availability of a position and appropriate research interests.
- GRE is optional and may be required by individual faculty mentors.

#### *Prerequisite courses required:*

- One year of general biology (lecture and laboratory)
- One year of any combination of chemistry, physics, or mathematics
- One course in applied or biological statistics (through regression and ANOVA)
- Additional prerequisite requirements may be set by individual faculty advisors

### PhD Program in Integrative and Systems Biology

- A BA/BS or MS from an accredited institution awarded within the last 10 years (validation of current content may be required)
- Minimum undergraduate GPA: 3.0
- TOEFL: required for international applicants from countries in which English is not the official language
- 3 letters of recommendation
- Official transcripts from all attended institutions
- A letter of support from your identified faculty mentor prior to application. Students are required to contact faculty in advance. Prior to application, applicants must have identified and contacted an available Faculty Advisor (see list on page 14) to ensure availability of a position and appropriate research interests.
- GRE is optional and may be required by individual faculty mentors.

#### *Prerequisite courses required:*

- One year of general biology (lecture and laboratory)
- One year of any combination of chemistry, physics, or mathematics
- One course in applied or biological statistics (through regression and ANOVA)
- Additional prerequisite requirements may be set by individual faculty advisors

## **FINANCIAL SUPPORT**

The following list of resources is non-exhaustive, and students should and are expected to discuss their financial plans for funding their education with their advisor, including plans for living expenses, tuition, research expenses, and health insurance.

Financial support for graduate students in biology is usually from a combination of research grants, fellowships, and teaching appointments.

*State Residency:* Students from out of state may wish to begin the process of applying for Colorado residency as soon as they arrive in the state. The process requires a one-year domicile period, meaning students must be physically present in Colorado for 12 months and show intent of making Colorado one's permanent home. Students are strongly encouraged to contact the Residency Office immediately to determine what is required in their particular situation. Student loans and other support can be applied for through the University of Colorado Financial Aid Office.

*Teaching Assistantships:* The Department of Integrative Biology offers Graduate Teaching Assistantships (GTA) on a competitive basis. GTAs typically work approximately 20 hours a week (9 months; 2 lab sections each semester). Any student on GTA (master's or doctoral) must enroll in BIOL 6002 (Pedagogy) during their first semester of teaching. Pedagogy is required for all doctoral students. Note: BIOL 6002 (Pedagogy) is only offered during the Fall semester of the academic year.

*PhD Fellowships:* PhD students are eligible for institutional support in the form of a limited number of competitive Doctoral GTA Fellowships. The Doctoral GTA Fellowship includes up to 5 years of support, including an optional 9-month GTA appointment, stipend, and tuition (tuition up to \$6,000/year, or \$30,000 total). Support can be supplemented by grants and fellowships awarded to students and/or faculty advisors. It is the responsibility of the student to contact both the Graduate Program Director and Program Coordinator to notify them of any grants and/or fellowships awarded.

*Merit Scholarships:* PhD candidates (post-comprehensive exam) can apply for a competitive Candidate Merit Scholarship, which provides a one-time, one or two semester teaching buyout. The intent of these awards is to provide support for timely completion of the dissertation. Applications are solicited once a year, in spring.

*Travel Grants:* The Department offers annual travel grants on a competitive basis. These grants can be used for travel to present research results at professional meetings. The maximum award amounts are typically around \$500 for domestic travel and \$750 for international travel (note: students may or may not receive the full award amount).

The Graduate School and College of Liberal Arts and Sciences both also offer support for graduate student travel to national meetings to present their thesis or dissertation work and will provide up to \$500 per meeting, via a separate application process. Contact Graduate Program Coordinator for information and applications. The Graduate School and College of Liberal Arts and Sciences will not award their travel support until students have received a departmental travel award. Apply to Department of Integrative Biology first, then apply for the Graduate School and College of Liberal Arts and Sciences awards.

## **CREDIT LOADS AND PROGRAM RESIDENCY REQUIREMENTS**

Graduate credits are classified as either coursework or dissertation/thesis. Independent study and directed research credits are considered coursework and count towards credit loads in both graduate degree programs. Pass/Fail courses and courses with less than a B- do not count toward the credit load in either degree program. Graduate students are discouraged from auditing courses, but if choosing to audit, must seek consent of the instructor as appropriate.

### *Enrollment Credits*

MS minimum is 24-27 coursework credits plus 3-6 thesis credits for the research program (30 total).  
PhD minimum is 30 coursework credits plus 30 dissertation credits (60 total).

#### Masters Students Full-time Status—

- Full-time when enrolled in 5 or more credits per semester.
- Part-time when enrolled in 4 or less credits per semester.
- 1 credit/summer *if* needed for financial aid status and/or for defense eligibility.

#### Doctoral Students Full-time Status—

- Full time when enrolled in 5 or more credits per semester.
- Part time when enrolled in 4 or less credits per semester.
- After passing comprehensive exam, to remain full-time must enroll in a minimum of 5 credits of dissertation per term until reaching 30 dissertation credits.
- Once 30 dissertation credits completed, must enroll in 1 credit, each Fall and Spring semester, to be considered full-time and until a successful defense of the thesis
- 1 credit/summer *if* needed for financial aid status and/or for examination/defense eligibility.

#### *Important Note:*

Students must be registered for the semester they plan to complete the preliminary examination (PhD), comprehensive examination (PhD), defend their proposals (MS degree), defend their thesis (MS degree), or defend final dissertation (PhD degree).

### *Minimum Duration of Residency in the Program*

- MS requires minimum 2 semesters of full-time enrollment (5+ credits/semester).
- PhD requires minimum 4 semesters full time enrollment (5+ credits/semester) if student holds MS degree.
- PhD requires minimum 6 semesters full time enrollment (5+ credits/semester) without MS degree.
- Note: Program Residency is not the same as State Residency for tuition purposes.

The minimal requirements above are a summary from the Graduate School Student Handbook (revision: 2021). Be sure to check the Graduate School policy and procedures document ([link](#)) for updated information.



## **Transfer Credits**

Transfer credit refers to any credit earned at another accredited institution either in the USA or abroad, or credits earned as a non-degree student within the CU system. Graduate course credits earned while the student was enrolled in a Graduate Program anywhere in the CU System, or an institution with established Memoranda of Understanding with CU Denver | Anschutz Medical Campus, fall outside the limits for transfer credits.

The maximum amount of transfer work that may be applied toward a graduate degree at CU Denver is twelve (12) hours of coursework for Master's degree programs and thirty (30) hours of coursework for PhD degree programs.

For students who earned graduate course credits while they were enrolled in a Graduate Program at a University in the USA, or students who earned credits within the CU System as a non-degree student, the number of course credits that can be transferred to CU Denver will be determined by the graduate Program Director on a case-by-case basis (subject to the limits described at the bottom of this paragraph). In the case of students who performed coursework at institutions outside the USA, Graduate Program Directors shall provide a recommendation to the Graduate School listing the courses that they accept for transfer and will also provide documentation including an independent evaluation by the Office of International Affairs to support the recommendation. The Graduate School Dean will evaluate the recommendation of the Program Director regarding the transfer of credits from foreign institutions and will make a determination of acceptance on a case-by-case basis.

Coursework accepted for transfer credit must not have been applied towards an undergraduate degree or another graduate degree of the same level (e.g., MA to MS). Specifically, Master's courses applied to one completed Master's degree program may not be applied to another Master's degree program; however, graduate level coursework (5000 level or above) completed for a Master's degree may be applied toward a doctoral degree with Program approval. Likewise, coursework of a completed doctoral degree may be applied toward a concurrent or subsequent Master's degree with Program approval.

Credit cannot be transferred until the student has established a satisfactory record of at least one term of enrollment at CU Denver and earned a minimum 3.00 GPA.

Transferred courses do not reduce the minimum duration of residency in the programs but may reduce the workload required at CU Denver for the degree.

All courses accepted for transfer must:

- Be graduate level (5000 or above)
- Have a "letter" grade (pass/fail not accepted)
- Have a grade of "B minus" or better
- Be validated by the Program Director if not taken within seven (7) years of the PhD comprehensive exam or the Master's final exam
- Be transferred prior to the semester in which the PhD comprehensive or Master's final examination is administered

## **PROGRAMS OF STUDY AND THEIR REQUIREMENTS**

The Department of Integrative Biology offers a research-based program for the MS degree in Biology, and a research-based program for the PhD degree in Integrative and Systems Biology. *Students are required to maintain a minimum 3.0 GPA in each of the programs.* Consequences for failing to meet this requirement are described in the Academic Probation section of the Graduate School Policy and Procedures document; students with GPA < 3.0 are ineligible for employment by Integrative Biology as a GTA.

## MS Degree

The MS program requires a minimum of 30 credits. A maximum of 12 hours of graduate level courses may be transferred and counted toward the degree (see section on transfer credits). The MS program requires the student to form an advisory committee and to deliver and orally defend written work before the advisory committee; this defense constitutes the final for the program as required by the Graduate School.

While it is expected that most of this coursework will be at the graduate level (5000 and above), up to two 4000 level undergraduate courses are allowed (maximum of 6 credits). Of those at least one must be from outside the Biology (different program four letter prefix) to count towards the graduate degree.

### MS Degree Program Requires

1. Writing coursework/curriculum plan (Pre-Registration Agreement form for guidance is available from Program Coordinator)
  2. Completing 30 credits including 3-6 thesis (BIOL 6950)
  3. Meeting minimum academic residency requirements
  4. Forming and meeting regularly with an advisory committee
  5. Writing and defending research proposal\*
  6. Writing and defending research thesis (including 1 or more publishable units)\*<sup>†</sup>
- \* paperwork required—see Program Coordinator

<sup>†</sup> *Publishable units are expected to reflect original contributions, advancing knowledge in your field, and should be suitable for publication in peer reviewed ISI-ranked journals. Technical reports and literature reviews often help build a body of work that shows domain expertise; these efforts are in many cases encouraged. However, for the completion of a successful masters thesis, these products should not substitute for manuscripts or dissertation chapters prepared for the primary peer-reviewed literature.*

## PhD Degree

The PhD program consists of multiple phases. Students must complete a minimum of 60 credits. Up to 30 hours of graduate level courses from other graduate programs may be transferred and counted toward the degree. Students must also pass the Preliminary Exam, form an Advisory Committee and an Examination Committee, meet the academic residency requirements, pass the Comprehensive Exam, and write and orally defend a dissertation.

### PhD Degree Program Requires

1. Writing coursework/curriculum plan (Pre-Registration Agreement form for guidance is available from Program Coordinator)
2. Completing 60 credits including 30 of dissertation (BIOL 8990)
3. Meeting minimum academic residency requirements
4. Forming Advisory Committees by end of 2<sup>nd</sup> semester
5. Meeting annually with Advisory Committee
6. Passing the Preliminary Exam (MS holding students *may* be exempt, see Preliminary Exam section)\*
7. Writing and defending a research proposal (defense of the research proposal is considered part of the Comprehensive Exam) in the 2<sup>nd</sup> or 3<sup>rd</sup> year\*
8. Writing and defending dissertation (2 or more publishable units)\* †

\* paperwork required—see Program Coordinator

† *Publishable units are expected to reflect original contributions, advancing knowledge in your field, and should be suitable for publication in peer reviewed ISI-ranked journals. Technical reports and literature reviews often help build a body of work that shows domain expertise; these efforts are in many cases encouraged. However, for the completion of a successful doctoral dissertation, these products should not substitute for manuscripts or dissertation chapters prepared for the primary peer-reviewed literature.*

## Contact Requirements and Leave of Absence

Students are expected to continue to work on their research program continuously. If a student removes themselves from the program for one year, with no contact with their advisor or committee, they may be placed on academic probation at the request of their advisor. After one year of probation, they may be released from the program. The student can appeal this decision with the Graduate Program Director (or Graduate School if there is a conflict of interest). The purpose of this contact stipulation is to encourage communication between student and advisor.

Students who need to leave the Graduate Program for a period of time (up to one year) should consult with their advisor and the Graduate Program Director for guidance on a **Leave of Absence (LOA)**. Personal LOAs are reviewed and approved entirely through the program and the Graduate School; medical LOAs are managed through the Office of Case Management on the student's home campus in collaboration with the program and the Graduate School. An approved LOA pauses the student's academic record and automatically extends the time limit for completing a degree by the equivalent amount of time that the student spends on leave. Requests for LOA that exceed one year may be approved with sufficient justification to the Dean of the Graduate School.

Students who do not return from their approved LOA will be considered to have withdrawn from their program and will either be required to formally re-apply for admission, or, at the discretion of the program, may be re-admitted through an expedited process.

## CURRICULUM, COMMITTEES, AND EXAMS

The graduate programs in biology share a minimum core curriculum and required additional specializations for each program are as follows. A coursework agreement is completed in the first semester with input from the faculty advisor (see Program Coordinator for form). See Appendix A for an example schedule. Some independent coursework, like BIOL 6880, can require a Special Processing Form, available from the Grad School website forms page or the Program Coordinator.

### Minimum core curriculum required by all graduate programs

BIOL 6705 (4 credits total) Biological Research Workshop (ideally taken in two different academic years)

BIOL 6655 (2 credits total) Seminar

BIOL 6764 (4 credits) Biological Data Analysis (ideally taken in first year)

BIOL 6002 (2 credits) Biology Skill Sets—Pedagogy (GTAs must take this during their first semester of teaching, however, it is required for all doctoral students, regardless of a GTA appointment).

### Additional minimum requirements for the research-based MS program

BIOL 6950 (1-2 credits) Master's Thesis in first year to write proposal

BIOL 6950 (2-4 credits) Master's Thesis in final semester to write thesis

### Additional minimum requirements for the research-based PhD program

BIOL 7010 (3 credits) Integrative and Systems Biology (ideally taken in year 1)

BIOL 7050 (3-9 credits) Special Topics (see Appendix B)

BIOL 8990 (30 credits total) Doctoral Dissertation, after passing Comprehensive Exam

### Recommended electives for all programs

BIOL 5840 (3-6 credits) Independent Study (background research and skill development)

BIOL 6880 (3-6 credits) Directed Research (data collection, model/analysis development)

ENGL 5175 (3 credits) Writing in the Sciences

## Advisor, Advisory Committees, and Examination Committees

**MS thesis advisor** is the primary research mentor for MS students

*Identified prior to admission by the student*

*See Appendix C*

**MS thesis advisory committee** advises research program, assesses proposal and thesis

*Formed by student before start of second year*

Minimum 3 faculty members, majority\* from Integrative Biology Faculty.

Chaired by and includes thesis advisor

**PhD dissertation advisor** is the primary research mentor for PhD students

*Identified prior to admission by the student*

**PhD examination chair** is responsible for managing the preliminary, comprehensive, defense examinations.

**PhD dissertation advisory committee** advises and monitors research progress

*Formed by student prior to preliminary examination*

Minimum 3 members, majority\* Integrative Biology Faculty.

Chaired by and includes dissertation advisor

*Assesses preliminary exam before the end of third year (recommended in first or second year)*

**PhD examination committee** assesses comprehensive exam **and** defense of dissertation

*Formed by student prior to comprehensive exam*

Minimum 4 members; dissertation advisory committee ( $\geq 3$ ) plus external chair for defense of dissertation\*\*

Can include members outside the department or university (with approval) if minimum requirements are met.

\* Majority is defined as  $\geq 50\%$

\*\* Exam committee chair may not also be on advisory committee, must be IB faculty

Formation of, and first meeting with, advisory committee should be done by the end of the second semester for both MS and PhD students.

The Graduate School requires PhD Advisory Committee meetings at least once per year after the student passes the Comprehensive Examination. The Graduate Program in Integrative and Systems Biology strongly encourages all MS and PhD students to schedule regular meetings (i.e. 1-2 times per year) with their full committee and/or with individual committee members for the remainder of their graduate program.

It is the student's responsibility to schedule, run, and register these yearly meetings. The importance of these meetings cannot be overstated; they protect the student and advisor from potentially disruptive misunderstandings that arise from lack of communication.

## Exams and other Milestones (MS program)

The MS Program includes the following milestones:

- 1) Writing MS thesis proposal and defending it during the MS Thesis Proposal Defense,
- 2) writing an MS Thesis and defending it during the MS Thesis Defense.

Students are encouraged to discuss particulars of each milestone with their thesis advisor, exam committee, and other faculty well in advance of the scheduled examination date.

### MS Thesis Proposal Defense

The MS proposal defense is where the student presents the background, methods, and analytical plans for their MS thesis work. The student must defend their rationale, proposed methods, and framework to their committee. It is an opportunity for the committee to evaluate if question is grounded in theory or otherwise appropriate, the methods address the questions and are reasonable, and the analytical framework is appropriate.

It is strongly suggested that the proposal be developed in conjunction with all committee members prior to the actual examination, to gather feedback and make for a stronger proposal.

Passing: The student has well defined questions, grounded in an appropriate background, and is cognizant of the work on which they are building knowledge. Methods are appropriate for the questions, and the analytical framework is sound. The student can discuss and defend their choices for the above. At the end of the defense, the student will have an approved initial plan for their work, with the recognition that their methods may continue to evolve through their educational program.

Failure: The student does not have strong questions, methods, or analytical framework, and/or does not have the appropriate background to develop them. The student cannot defend or discuss their choices, and there is low likelihood of success in their dissertation (producing at least two publishable units).

- Must be completed by the end of the 3<sup>rd</sup> semester of the program and cannot be done in the same semester as the thesis defense.
- The written research proposal must be submitted to the MS thesis advisory committee 2 weeks prior to oral defense.
- The student is expected to work with their advisory committee and thesis advisor in the preparation of the proposal.
- Assessment can result in pass, conditional pass, or failure (*form required—see Program Coordinator*).

Conditional Pass requirements must be satisfied within 4 months of the exam (including summer months).



Failure may lead to

- Committee offering a second attempt within 4 months
- Committee recommending transfer to coursework program
- Committee recommending dismissal from MS program

## MS Thesis Defense

This final examination is a cumulative evaluation of the student's skills in research, communication, contextualization of their research project, and elaboration on future directions in their field.

Passing: The student has produced information that advances their chosen field and can discuss their contributions and place in the broader body of research. Primarily, they have produced at least one publishable unit for peer review (either published, submitted, or ready for submission).

Failure: The student has not produced work at the level of a peer reviewed publication.

- Includes a written thesis submitted to the MS thesis committee 2 weeks prior to oral presentation.
- The format of the thesis is determined in consultation with the thesis advisor and advisory committee but generally follows author guidelines for publication in an appropriate peer-reviewed journal.
- The oral presentation of the thesis is open to the public and must be widely advertised.
- Presentation of the MS thesis is followed by a private defense before the MS thesis advisory committee.
- The defense can result in pass, conditional pass, or failure (*form required—see Program Coordinator*).

Conditional Pass requirements must be satisfied within 4 months of the exam (including summer months).

Failure may lead to:

- Committee offering a second attempt within 4 months
- Committee recommending dismissal from MS program

## **Exams and other Milestones (PhD program)**

The PhD Program includes the following milestones:

- 1) Completing the Preliminary Examination
- 2) Writing a dissertation proposal and defending it during the Comprehensive Examination,
- 3) Writing the dissertation and defending it during the Final Examination.

Students are encouraged to discuss particulars of each milestone with their Dissertation Advisor, Exam Committee, and other faculty well in advance of the scheduled examination date.

### **PhD Preliminary Examination**

The purpose of the preliminary exam is 1) to provide a formal forum by which the student and advisory committee can discuss background research in the student's chosen field of study, and 2) to assess student competence in understanding materials and suitability for pursuing a PhD. Each committee member will submit to the student a list of readings, developed in conjunction with the student if appropriate, centered around the historical background of the chosen field, key readings to their area of interest, or other significant documents as the committee member feels appropriate for the student. The student will prepare written responses to the questions each committee member provides about those readings and be prepared to discuss those at the preliminary exam committee meeting. The scale and scope of the exam should be determined by the advisory committee to avoid overloading the student (for example the group may determine that there should be no more than five readings per committee member) but is intentionally left non-proscriptive to allow for personalization and flexibility to best serve the student. Example topics include: evaluating evidence underpinning established models, identifying knowledge gaps, and/or proposing follow-up studies that would advance the field beyond the limitations of the paper(s).

**Passing:** A student can carry on an informed conversation about the readings, including implications and potential shortcomings, demonstrating critical thinking and the ability to make connections across studies. While need for additional foundations may be present at this stage in their graduate career, the committee agrees that the student has the time to address those gaps (methodological, theoretical, etc.) while moving through the program at the normal pace.

**Failure:** A student cannot discuss the readings with the committee, makes fundamental mistakes about the content, or has not demonstrated a commitment to understanding as demonstrated by asking questions or pursuing advice during the exam. The committee cannot see the student addressing deficiencies in a reasonable amount of time for a PhD. Failure may result a requirement for a retake (one time only), a recommendation to convert to an MS pathway, or dismissal from the program.

*Students with science-based thesis Masters degrees can be exempted from this requirement (approved by Primary Advisor and Program Director).*

- Should be completed by end of year two but must be completed prior to the Comprehensive Examination (which itself must be completed by the end of the 3<sup>rd</sup> year).
- Includes a written and oral component and is an opportunity to evaluate whether students are developing the qualities of a PhD, e.g., self-directed, able to identify and answer relevant questions in their field of specialization and able to contextualize work in their field to broader concepts in biology. The PhD Dissertation Advisory Committee conducts the exam and determines its specific focus and time frame.
- The assessment is not based on original work of the student to date, but rather is focused on critical literature review, contextualization of concepts, and the application of modern methods to address larger questions in biology.
- It is the responsibility of the student and primary advisor to coordinate with the committee to (1) schedule deadline for submitting the written portion and (2) convene the oral portion of the exam
- The student will be given a set of questions by each committee member to respond in written format at least two weeks prior to the in-person meeting and be prepared to discuss those responses and the readings at the oral examination.
- The Dissertation Advisor will collect and distribute the response(s) to the committee at the end of the written portion of the exam.
- The committee may choose to share feedback on the written exam prior to the oral exam.
- At the oral exam, the student will be asked to defend and elaborate on the written responses, based on committee feedback and questions.
- The Preliminary Examination results in pass, conditional pass, or failure. (*form provided by the Program Coordinator*).

Conditional pass requirements must be satisfied within 4 months of the exam (including summer months).

Failure may lead to:

- Committee recommending transfer to the MS program
- Committee recommending dismissal from all graduate programs

## PhD Comprehensive Examination

The comprehensive examination, sometimes called the **proposal defense**, is where the student presents the background, methods, and analytical plans for their PhD dissertation work. The student must defend their rationale, proposed methods, and framework to their committee. It is an opportunity for the committee to evaluate if question is grounded in theory or otherwise appropriate, the methods address the questions and are reasonable, and the analytical framework is appropriate.

It is strongly suggested that the proposal be developed in conjunction with all committee members prior to the actual examination, to gather feedback and make for a stronger proposal.

Passing: The student has well defined questions, grounded in an appropriate background, and is cognizant of the work on which they are building knowledge. Methods are appropriate for the

questions, and the analytical framework is sound. The student can discuss and defend their choices for the above. At the end of the defense, the student will have an approved initial plan for their work, with the recognition that their methods may continue to evolve through their educational program.

Failure: The student does not have strong questions, methods, or analytical framework, and/or does not have the appropriate background to develop them. The student cannot defend or discuss their choices, and there is low likelihood of success in their dissertation (producing at least two publishable units).

- Must be completed before the end of the third year in the program.
- Students must have completed or registered for all non-thesis coursework required by the program before submitting request for exam.
- Students may not participate in the comprehensive examination if on probation or if not enrolled in any credit hours.
- Includes both written and oral components and is designed to reveal the potential capacity for a student to contribute original discovery to the field.
- The written component consists of the dissertation research proposal, which should expose sufficient depth of background knowledge and feasibility of approach for the dissertation to impact the field via original discovery.
- The written proposal must be submitted to the PhD Examination Committee at least 2 weeks prior to the scheduled oral examination.
- The ~50 minute oral examination seminar must be advertised and open to the public.
- The public seminar is followed by a private defense before the Examination Committee, and results in pass, conditional pass, or failure.
- Committee is encouraged to ask questions that will probe the student's knowledge of the field of study highlighted by the research.
- Committee provides feedback and advice, collated by the PhD examination chair.
- Students who pass the Comprehensive Exam automatically advance to PhD candidate status. (*multiple forms required in advance – see Program Coordinator*).

Conditional Pass requirements must be satisfied within 4 months of the exam (including summer months).

Failure may lead to:

- Committee recommending transfer to MS program
- Committee recommending dismissal from all graduate programs

## **PhD Final Examination**

This final examination is a cumulative evaluation of the student's skills in research, communication, contextualization of their research program, development of research products, and elaboration on future directions in their field.

Passing: The student has produced novel information that advances their chosen field and can discuss their contributions and place in the broader body of research. Primarily, they have produced at least two publishable units for peer review (either published, submitted, or ready for

submission).

Failure: The student has not produced work at the level of peer reviewed publications.

- The final exam of the PhD program with both written and oral components in defense of the completed dissertation.
- The written component consists of the dissertation chapters, which should represent a minimum of two publishable units suitable for publication in the peer-reviewed ISI-ranked primary literature.
- The dissertation must be submitted to the PhD Examination Committee at least two weeks prior to scheduled oral examination
- The oral examination seminar must be advertised and open to the public.
- The public seminar is followed by a private defense before the Examination Committee, and results in pass, conditional pass, or failure.
- Students who pass the Final Exam must submit their final dissertation to the Graduate School to be eligible for their doctoral degree (*multiple forms required in advance*).

Conditional Pass requirements must be satisfied within 4 months of examination (including summer months). Failure may lead to:

- Committee recommending transfer to MS program or
- Committee recommending dismissal from all graduate programs

## **Forms and Procedures for Graduation (MS and PhD)**

There is a strict timeline and set of forms/procedures determined by the graduate school to graduate. This involves applying for graduation near the beginning of the term and following up with several pieces of paperwork to continue the process. It is imperative that these are done on time by the student. It is the student's responsibility to start and follow this process.

All graduate school forms are available on the Graduate School forms webpage. Consult with the Program Coordinator on any questions.

At start of the final term, be sure to:

1. Obtain and submit application for graduation with Graduate School (note this deadline is early in the semester)
2. Obtain and submit application to candidacy (MS only) with Graduate School
3. Complete thesis format review
4. Submit electronic thesis to the Graduate School by deadline
5. Schedule final exam/defense
6. File request for exam 2 weeks prior to exam
7. Submit Statement of Approval Form to the Graduate School prior to final thesis
8. Submit final revised thesis to Graduate School prior to published deadline

**APPENDIX A: EXAMPLE PATHS THROUGH COURSEWORK AND GRADUATION REQUIREMENTS**

**Example path through MS**

<i>Year 1 Fall</i>	<i>Year 1 Spring</i>	<i>Year 2 Fall</i>	<i>Year 2 Spring</i>	<i>Year 3+</i>
BIOL 6705	BIOL 6764	BIOL 6705	BIOL 6950	BIOL 6950
BIOL 6002 (if GTA)	BIOL 6950	BIOL 6880	BIOL 6655	
BIOL 6655	ENGL 5175			
Coursework plan	Additional coursework to minimum of 30 credits			
Form thesis advisory committee		Meet with Committee	Meet with Committee	Meet with Committee
Defense of MS proposal			Publication of research and Defense of Thesis	

**Example path through PhD**

<i>Year 1 Fall</i>	<i>Year 1 Spring</i>	<i>Year 2 Fall</i>	<i>Year 2 Spring</i>	<i>Year 3 Fall</i>	<i>Year 3 Spring</i>
BIOL 6002 (if GTA)	BIOL 6705	ENGL 5175	BIOL 6655	BIOL 6880	BIOL 6880
BIOL 7010	BIOL 6764	BIOL 7050	BIOL 6705	BIOL 7050	
BIOL 6655					
Coursework plan	Additional coursework to minimum 30 course credits				
Form dissertation advisory committee		Meet with Advisory Committee		Meet with Advisory Committee	
		Preliminary exam Form examination committee Write research proposal		Comprehensive exam Defense of research proposal	

<i>Year 4 Fall</i>	<i>Year 4 Spring</i>	<i>Year 5 Fall</i>	<i>Year 5 Spring</i>	<i>Year 6+</i>
BIOL 8990	BIOL 8990	BIOL 8990	BIOL 8990	BIOL 8990
Take between 5-10 dissertation (BIOL 8990) credits each semester up to 30 total				
Advisory Committee	Advisory Committee	Advisory Committee	Advisory Committee	Advisory Committee
Publication of research			Defense of Dissertation	

## **APPENDIX B: 7050 POLICY**

### **Policy Goals**

- 3-9 credits of 7050 are required for the PhD in Integrative and Systems Biology.
- 7050 courses are intended to be seminar-style courses.
- 7050 courses are flexible in their design to provide the most appropriate educational experience for PhD students.
- The purpose of 7050 courses are to expose students to cutting edge research and methods and to strengthen teamwork, reasoning, quantitative and/or argumentative writing skills (e.g. outcome could be a co-authored paper).

### **Considerations**

- Students should take the lead in advocating for topics and identifying the faculty they want to deliver the course.
- Students should start approaching faculty during the preceding semester.
- There needs to be a minimum of three students enrolled in the course by census date.
- 7050 courses can be 1-3 credits.
- Courses can be team taught, e.g., up to three faculty.
- Faculty participating in a 7050 are not relieved of their scheduled teaching duties.

### **Procedure**

1. Students should work with faculty in the preceding semester to design a course and choose number of credits, days, times.
2. Faculty should notify the department Chair and Associate Chair of their plans to teach a 7050 and discuss workload recognition.
3. 7050 requests (title, number of credits, days, times, instructor) should be submitted to the Associate Chair for addition to the schedule about half-way through the preceding semester. Requests should cc the faculty instructor and the department Chair. The Associate Chair will check for any duplications with other student groups and work with Scheduler to get the course into the portal.

### Examples of Previous 7050:

Spring 2021: Bayesian Models and Analysis (Wunder)  
Fall 2020: Evolutionary and Ecological Genetics (Ragland)  
Spring 2020: Disturbance Ecology (Tomback)  
Fall 2019: Neuroendocrinology (Greenwood)  
Spring 2019: Applied Ecology (Buma)  
Advanced Behavioral Neuroscience (Swallow)  
Fall 2018: Applied Conservation (Hartley)  
Spring 2018: Hierarchical Bayesian Analysis (Wunder)  
Vegetation Metrics and Data Analysis (Tomback)  
Plant Ecology (Greene)



## APPENDIX C: REASONABLE EXPECTATIONS FOR THE ADVISOR/STUDENT RELATIONSHIP



### Graduate Advisors

Graduate advisors are expected to communicate openly and honestly about the funding situation in their labs and about their mentoring philosophies as related to the student's goals for graduate school. The advisor is expected to identify benchmarks that would indicate satisfactory progress through the program, and to conduct an open discussion about expectations related to publication, authorship order, and applying for grants to help cover the costs of stipends, tuition, and research expenses. These discussions are expected to occur very early and often in the student program, ideally starting even before the student joins the lab.

Graduate advisors are expected to work with students to identify thesis topics that match student interests and that build on their strengths. Complementary to this, advisors are expected to guide the development of a program of study for the student, and to assist in managing (but not to determine or facilitate) the schedule of milestones and associated forms required for graduation.

**Graduate advisor mentoring should result in students becoming independent scientists.** To that end, graduate advisors are expected to mentor students in the design of projects, and in all aspects of the implementation and presentation of research. The advisor should encourage students to give frequent presentations on various stages of their research, especially the proposal development stage. Advisors guide students to develop presentations intended for a range of audiences, from those in the research lab up to an audience at an internationally attended professional meeting. When possible, the advisor should attend professional meetings with the student and help the student establish connections with other scientists who might benefit some aspect of the student's research or future career. Advisors are expected to mentor students in scientific writing and in publishing their work in peer-reviewed journals as these activities form the basis for professional network development in the sciences.

### Graduate Students

Graduate students are expected to communicate regularly with their advisor and their advisory committee about the progress and problems of their research programs. Students are expected to behave independently and to take responsibility for their own learning, including asking for help when required. Students are ultimately responsible for developing a defensible research proposal that will lead to eventual publication of results in a peer-reviewed outlet.

Students are expected to professionally represent the Graduate Program, the Department of Integrative Biology, and their advisor at all times. Students should actively engage in their advisor's lab group and collaborate with other students in the graduate program as appropriate. Students are expected to network with other students and faculty in the Program and at other Universities by presenting their research at professional conferences. Students are expected to become aware of and pursue funding opportunities to enhance their research programs.

Students are expected to manage their time wisely so that they can meet deadlines established by their advisor, by their advisory committee, by course instructors, by the graduate program, or by the graduate school. Students are expected to understand Department, Program, and Graduate School policies as they relate to student conduct, requirements, and timelines.

Students are expected to arrange for health insurance through the ACA or other means and to maintain other insurance needed for their graduate school activities. If students are anticipating being without coverage, they should discuss this potential with their advisor to find options for continuing their insurance coverage through their tenure in the program.

Students are ultimately responsible for understanding and adhering to all requirements for graduation, and (of course) are *expected to enjoy their time in graduate school*.

### Research Assistantships

If the position involves a paid research assistantship or other contractual work, the advisor and student should work together to develop reasonable and realistic expectations for work hours, vacation days, holidays, milestones, and other important work/progress expectations. If desired by either party, a written document can be created and placed on file with the Program Coordinator.

## APPENDIX D: POLICY REGARDING STUDENT EMPLOYEE WORK HOURS



Title: Student Employee Work Hours  
Prepared by: Assistant Vice Chancellor for Human Resources  
Effective Date: July 1, 2015  
Applies: Anschutz Medical Campus and Denver Campus

### Introduction

The University of Colorado Denver | Anschutz Medical Campus has adopted certain requirements and guidelines for student employees. The University of Colorado, including the Anschutz, Boulder, Denver and Colorado Springs campuses as well as the CU system office is one employer for the purpose of counting student employee work hours. Additional information regarding student employment is available in the Student Employment Handbook located on the Student Employment website.

### Policy Statement

- 1) Maximum work hours allowed.
  - a) Multiple positions.
    - i) All campuses and system administration of the University of Colorado and all departments, colleges, centers, divisions or other degree or non-degree units are considered one employer under Internal Revenue Service rules.
    - ii) Students working in more than one position at a University of Colorado campus and/or system administration of the University of Colorado are required to:
      - I. Disclose current CU Employment at the time of application for any subsequent CU jobs. Should the student employee be offered additional jobs, s/he must inform his or her other supervisor(s) and gain their approval prior to accepting any offer.
      - II. The first department currently employing a student is the primary department. The student's supervisor in this department will be considered the supervisor of record.
      - III. Additional disclosure to the supervisors is required any time the student employee changes positions.
  - b) The number of hours a student employee may work in all positions combined (the aggregate of a student employee's multiple positions in multiple departments for any University of Colorado employer) is limited as follows:
    - i) Fall and spring semesters: For the purpose of this policy, the fall semester is defined as August 15 through January 1 and the spring semester is defined as January 1 through May 15. The maximum number of hours a student employee may work during a fall or spring semester is 25 hours per week or 50 hours per bi-weekly

- payroll period, provided no single week in that period exceeds 40 work hours.
- ii) Summer: For the purpose of this policy, summer is defined as May 15 through August 15. The maximum number of hours a student employee may work during the summer is 40 hours per week.
  - c) Student employees exceeding the work hour limits established above may become eligible for employee health benefits under the Affordable Care Act. Employee Services will notify the student and primary supervisor of such eligibility.
  - d) Exception: The employing department head(s) may determine that the department(s) business purposes or work objectives cannot be accomplished within the work hour limits established above.
- 2) Consequences
- a) Supervisors are responsible for communicating this policy to their student employees and student employees are responsible for communicating with the supervisor(s) if they are no longer students or are scheduled to work more than the maximum total work hours allowed for all jobs.
  - b) In the event a student employee becomes eligible for employee health benefits under the Affordable Care Act, employer benefits contributions will be proportionately charged to the department(s) where the student was employed when the limits were exceeded, regardless of where the student is currently employed.

Departments may also be subject to additional administrative charges as violation of this policy subjects the University to additional exposure under the Affordable Care Act.

## APPENDIX E: DEPARTMENT OF INTEGRATIVE BIOLOGY GRADUATE PROGRAM ASSOCIATE & AFFILIATE FACULTY MEMBERS

### Graduate Program Associated Faculty

(Potential research advisors are listed in alphabetical order below, along with a brief description of their research interests. Students interested in pursuing an MS or PhD in a research topic aligned with a faculty member below should contact the faculty member directly using the provided email address.)

**Branco, Sara – Assistant Professor**

Department of Integrative Biology

*Research Interests: Ecology and evolution of fungi, fungal diversity, adaptation to hostile environments*

[sara.branco@ucdenver.edu](mailto:sara.branco@ucdenver.edu)

**Buma, Brian – Associate Professor**

Department of Integrative Biology

*Research Interests: Disturbance and landscape ecology, forest ecosystems, succession, and spatial ecology*

[brian.buma@ucdenver.edu](mailto:brian.buma@ucdenver.edu)

**Charlesworth, Amanda – Associate Professor**

Department of Integrative Biology

*Research Interests: Molecular developmental biology, cell biology*

[amanda.charlesworth@ucdenver.edu](mailto:amanda.charlesworth@ucdenver.edu)

**Greene, Michael – Professor**

Department of Integrative Biology

*Research Interests: Chemical ecology, behavioral ecology, physiology*

[michael.greene@ucdenver.edu](mailto:michael.greene@ucdenver.edu)

**Hartley, Laurel – Associate Professor**

Department of Integrative Biology

*Research Interests: Pedagogy, community and ecosystem ecology*

[laurel.hartley@ucdenver.edu](mailto:laurel.hartley@ucdenver.edu)

**Infante, Carlos—Assistant Professor**

Department of Integrative Biology

*Research Interests: Functional and comparative genomics, developmental biology and phylogenetics*

[carlos.infante@ucdenver.edu](mailto:carlos.infante@ucdenver.edu)

**Miller, Chris –Associate Professor**

Department of Integrative Biology

*Research Interests: Sequencing, microbial ecology*

[chris.miller@ucdenver.edu](mailto:chris.miller@ucdenver.edu)

**Mosier, Annika – Assistant Professor**

Department of Integrative Biology

*Research Interests: Biogeochemistry, microbial ecology*

[annika.moiser@ucdenver.edu](mailto:annika.moiser@ucdenver.edu)

**Phiel, Christopher – Associate Professor**

Department of Integrative Biology

*Research Interests: Molecular biology, pathway signaling, biological chemistry*

[christopher.phiel@ucdenver.edu](mailto:christopher.phiel@ucdenver.edu)

**Ragland, Greg – Associate Professor**

Department of Integrative Biology

*Research Interests: Seasonal adaptation, genomics*

[gregory.ragland@ucdenver.edu](mailto:gregory.ragland@ucdenver.edu)

**Roane, Timberley – Associate Professor**

Department of Integrative Biology

*Research Interests: Microbial physiology, heavy metal contamination, microbial bioremediation*

[timberley.roane@ucdenver.edu](mailto:timberley.roane@ucdenver.edu)

**Stith, Brad – Professor**

Department of Integrative Biology

*Research Interests: Developmental biology, cell biology*

[brad.stith@ucdenver.edu](mailto:brad.stith@ucdenver.edu)

**Swallow, John – Professor**

Department of Integrative Biology

*Research Interests: Experimental comparative physiology, evolutionary biology and animal behavior*

[john.swallow@ucdenver.edu](mailto:john.swallow@ucdenver.edu)

**Tomback, Diana – Professor**

Department of Integrative Biology

*Research Interests: Evolution, ecology and succession, population biology*

[diana.tomback@ucdenver.edu](mailto:diana.tomback@ucdenver.edu)

**Vajda, Alan – Associate Professor**

Department of Integrative Biology

*Research Interests: Endocrine disruption, environmental toxicology, ecological developmental biology*

[alan.vajda@ucdenver.edu](mailto:alan.vajda@ucdenver.edu)

**Wunder, Mike – Associate Professor**

Department of Integrative Biology

*Research Interests: Behavior and dynamics of migratory animal populations*  
[michael.wunder@ucdenver.edu](mailto:michael.wunder@ucdenver.edu)

## **Associate Faculty**

### **Bland, Sondra – Associate Professor**

Department of Psychology

*Research Interests: Behavioral neuropharmacology, behavioral neuroscience*  
[sondra.bland@ucdenver.edu](mailto:sondra.bland@ucdenver.edu)

### **Espinosa, Joaquin – Professor**

Department of Pharmacology

*Research Interests: Gene regulatory networks in human disease*  
[joaquin.espinosa@ucdenver.edu](mailto:joaquin.espinosa@ucdenver.edu)

### **Greenwood, Benjamin – Associate Professor**

Department of Psychology

*Research Interests: Behavioral, neuroscience, exercise neuroscience*  
[benjamin.greenwood@ucdenver.edu](mailto:benjamin.greenwood@ucdenver.edu)

### **Ren, Xiaojun– Associate Professor**

Department of Chemistry

*Research Interests: Stem cells, epigenetics, single-molecule imaging*  
[xiaojun.ren@ucdenver.edu](mailto:xiaojun.ren@ucdenver.edu)

### **Shaikh, Tamim —Associate Professor**

Department of Pediatrics

*Research Interests: Clinical genetics and metabolism*  
[tamim.shaikh@ucdenver.edu](mailto:tamim.shaikh@ucdenver.edu)

## **Affiliate Faculty**

### **Ackerfield, Jennifer – PhD**

Denver Botanic Gardens

*Research Interests: Biodiversity of the Southern Rocky Mountains, Flora of Colorado, Evolution, Systematics, Biogeography of thistles (Cirsium) in North America*  
[jennifer.ackerfield@botanicgardens.com](mailto:jennifer.ackerfield@botanicgardens.com)

### **Alba, Christine – PhD**

Denver Botanic Gardens

*Research Interests: Plant biodiversity and distributions, invasion biology, use of natural history collections in ecological research*  
[christine.alba@botanicgardens.com](mailto:christine.alba@botanicgardens.com)

**Augustine, David – PhD**

United States Department of Agriculture

*Research Interests: Plant-herbivore interactions, the ecology and management of semi-arid rangelands, and conservation biology*

[david.augstine@ars.usda.org](mailto:david.augstine@ars.usda.org)

**Bentz, Barbara – PhD**

United States Department of Agriculture

*Research Interests: Biology, ecology, management of bark beetles, physiological aspects of bark beetle response to temperature, modeling climate change influences on bark beetle populations, and fire and bark beetle interactions*

[barbara.bentz@usda.gov](mailto:barbara.bentz@usda.gov)

**Conrey, Reesa – PhD**

Colorado Parks and Wildlife

*Research Interests: Avian researcher, prairie birds and raptors*

[reesa.conrey@state.co.us](mailto:reesa.conrey@state.co.us)

**Cushing, Paula – PhD**

Denver Museum of Nature & Science

*Research Interests: Evolutionary biology, arachnology, biodiversity, taxonomy*

[paula.cushing@dmns.org](mailto:paula.cushing@dmns.org)

**Dinsmore, Stephen J. – PhD**

Iowa State University

*Research Interests: Is centered on the intersection of avian ecology and population biology and focuses on applied issues related to specific management questions*

[cootjr@iastate.edu](mailto:cootjr@iastate.edu)

**Dwyer, Angela – PhD**

Bird Conservancy of the Rockies

*Research Interests: Waterbirds, Mountain Plover, grassland birds*

[angela.dwyer@birdconservancy.org](mailto:angela.dwyer@birdconservancy.org)

**Grevstad, Nels – PhD**

Metropolitan State University

*Research Interests: Ecological and environmental statistics, estimation theory, nonparametric regression*

[ngrevsta@msu.edu](mailto:ngrevsta@msu.edu)

**Hufft, Rebecca – PhD**

Denver Botanic Gardens

*Research Interests: Conservation biology, ecology and evolution, biodiversity, restoration*

[rebecca.hufft@botanicgardens.org](mailto:rebecca.hufft@botanicgardens.org)



**Lanctot, Richard – PhD**

U.S. Fish and Wildlife Service

*Research Interests: Avian biology, shorebird migration and breeding ecology, animal behavior*

[richard\\_lanctot@fws.gov](mailto:richard_lanctot@fws.gov)

**Larson, Erica – PhD**

University of Denver

*Research Interests: How sexual selection and genomic conflict shape the evolution of reproduction, and how divergence in these key reproductive traits contribute to speciation*

[erica.larson@du.edu](mailto:erica.larson@du.edu)

**Linkhart, Brian – PhD**

Colorado College

*Research Interests: Avian ecology, avian conservation*

[blinkhart@coloradocollege.edu](mailto:blinkhart@coloradocollege.edu)

**Marra, Peter – PhD**

Smithsonian National Zoo and Conservation

*Research Interests: Ecology, migratory patterns and decline of birds across the Western Hemisphere*

[rarrap@si.edu](mailto:rarrap@si.edu)

**Neale, Jennifer – PhD**

Denver Botanic Gardens

*Research Interests: Rare plant conservation, conservation genetics, biodiversity conservation*

[nealejr@botanicgardens.org](mailto:nealejr@botanicgardens.org)

**Ruvalcaba-Ortega, Irene – PhD**

Universidad Autonoma de Neuvo Leon

*Research Interests: Monitoring, ecology and conservation of birds. Grassland bird ecology and conservation.*

[irene.ruvalcabart@uanl.edu.mx](mailto:irene.ruvalcabart@uanl.edu.mx)

**Schoettle, Anna – PhD**

United States Department of Agriculture, U.S. Forest Service

*Research Interests: Provide a solid scientific foundation for proactive management to facilitate a shift from crisis management of natural resources to proactive management for sustained ecosystem function and resiliency*

[anna.schoettle@usda.gov](mailto:anna.schoettle@usda.gov)

**Skagen, Susan – PhD**

United States Geological Survey

*Research Interests: Avian ecology, migration stopover ecology, reproductive performance, wetland-dependent birds, grassland birds*

[skagens@usgs.gov](mailto:skagens@usgs.gov)

**Spellman, Garth – PhD**

Denver Museum of Nature & Science

*Research Interests: How recent and ancient environmental changes have affected bird species, comparative phylogeography, evolutionary genomics of birds*

[garth.spellman@dmns.org](mailto:garth.spellman@dmns.org)

**Wehtje, Walter – PhD**

Ricketts Conservation Foundation

*Research Interests: Conservation, greater Yellowstone ecosystem and adjoining western states*

[wwehtje@rickettsconservation.org](mailto:wwehtje@rickettsconservation.org)

**Wilson, Andrew –PhD**

Denver Botanic Gardens

*Research Interests: Mycology, taxonomy, systematics, evolution and ecology*

[andrew.wilson@botanicgardens.org](mailto:andrew.wilson@botanicgardens.org)

**Please note:** This list is not intended to be all-inclusive but rather a guideline of faculty that students can reach out to during their advisor search. If you know of others that should be added to the list, please contact the Graduate Program Coordinator, Molly O'Connor ([molly.oconnor@ucdenver.edu](mailto:molly.oconnor@ucdenver.edu)) so they may be added.