Graduate Student Handbook

Department of Biological Sciences
Northern Arizona University

Revised January 2025

Provisions in this handbook that refer to policies practices or deadlines established by the Department of Biological Sciences will remain in force until they are superseded by subsequent revisions.

Content in this handbook that refers to policies, practices or deadlines established by the NAU Office of Graduate and Professional Studies (OGPS) or other NAU entities will be updated as we learn of them. However, it is the responsibility of individual Graduate Students to meet all University, OGPS and Department requirements and deadlines.

Twenty years from now you will be more disappointed by the things that you didn't do than by the ones you did do, so throw off the bowlines, sail away from safe harbor, catch the trade winds in your sails. Explore, Dream, Discover. **— Mark Twain**

GRADUATE STUDENT HANDBOOK

Department of Biological Sciences, Revised October 2024

CONTENTS

INTRODUCTION

Welcome to NAU and the Department of Biological Sciences. We recognize the challenges associated with relocating to a new place, institution and program, and hope that this handbook will serve as a valuable source of information throughout your stay. This edition of the Handbook incorporates the most recent policy revisions by the Department faculty, University Graduate Committee, Office of Graduate and Professional Studies (OGPS), and NAU.

At present the Department of Biological Sciences includes more than 60 faculty, 120+ graduate students, many academic and technical staff, and over 3000 undergraduate students dispersed among majors and emphases in Biology, Biomedical Science, Ecology and Evolutionary Biology, Exercise Physiology, Microbiology, and Secondary Education–Biology. All segments of the Department share a long history of teamwork on both professional and social levels, and all members of the Department contribute significantly to the Department's functions and well-being.

We believe that graduate education provides training for a profession, and we expect students to engage fully in the Department as professionals. This includes contributing substantially to departmental affairs; excelling in course performance and teaching roles; serving as thoughtful, responsible representatives of the Department and University on and off campus; and both receiving and providing constructive criticism during interactions with faculty and student colleagues.

Many sources of information about Flagstaff, NAU and the Department are available to you. The Chamber of Commerce is a short walk from campus and provides information about life in and around Flagstaff, and *Flagstaff 365* contains information about and links to many activities scheduled in and around Flagstaff.

General information and policies concerning graduate study at NAU, as well as courses offered by the Department, are described in the online NAU Academic Catalog, and at the Office of Graduate and Professional Studies (OGPS) website. Note that OGPS was formerly called the Graduate College. The NAU Catalog also contains a wealth of information about the University and the services it provides. On a more local scale, faculty, staff, and graduate students can assist you as you integrate into the program and community.

In conjunction with the NAU Catalog and the OGPS website, this Handbook provides a concise and detailed statement of current policies, guidelines and deadlines you must follow during your graduate career at NAU. The Handbook describes most information relevant to you, but changes may occur prior to your arrival or during your studies in the Department. Alterations in policy or process will be incorporated in subsequent editions of the Handbook.

We want to emphasize two particularly important points:

- You need to become thoroughly familiar with this Graduate Student Handbook, the online NAU Academic Catalog, and documents and policies available on the Office of Graduate and Professional Studies (OGPS) website.
- As an advanced student and professional, it is ultimately **your responsibility** to know and adhere to the policies, regulations, guidelines and deadlines described in this handbook and the aforementioned University and OGPS publications. Please do not rely solely on other students, your major advisor, other faculty, or various staff to provide up-to-date information about your program requirements. If you have questions or concerns about policies or procedures, contact the Director of Graduate Studies for the Department at AskBioGrad@nau.edu

TO WHOM THE HANDBOOK APPLIES

The contents of this handbook are applicable to all new graduate students joining the Department. Continuing students have the option of fulfilling degree requirements (a) in effect at the time of their initial admission into their program, or (b) in use with a later (current) edition of the handbook. If you plan to adhere to policies or guidelines in effect when you began your program (rather than a current edition), you must seek approval from your advisor and/or the Director of Graduate Studies for the Department of Biological Sciences.

ADMISSION TO BIOLOGY GRADUATE PROGRAMS

The Department offers two degree programs: Master of Science (M.S.) and Doctor of Philosophy (Ph.D.). The Master of Science program provides training in the biological sciences through coursework and research experience. The Doctor of Philosophy program provides advanced training in research through focused coursework and extensive research experience. Both the M.S. and Ph.D. programs offer an optional emphasis in Ecology, Evolution and Conservation Biology. Other sections of this Handbook describe these programs and their associated requirements in detail.

Entry into the Biology Department's graduate programs requires on-line application to the OGPS and review by both the Department of Biological Sciences and the OGPS.

General requirements for admission to the graduate program are given in the NAU Academic Catalog (found here) as well as at the Office of Graduate and Professional Studies website. A completed application to the Department's Graduate Program consists of the OGPS on-line application form; satisfactory course grades; three letters of recommendation addressing qualifications for advanced studies; a Personal Statement outlining the student's interests, professional goals, and research and teaching experience. The general Graduate Record Examination (GRE) or Advanced subject GRE scores are **not** required and will not be considered as a formal part of an application.

The most important point about the review process: admission depends upon the availability of a Faculty Advisor/Major Professor who has expressed a willingness to accept a student into her/his research group. Prospective students should contact faculty directly by e-mail and/or phone, and be prepared to discuss their backgrounds, specific areas of interest, and career goals with potential faculty advisors. Of course, funding for the student, adequate space, research resources and equipment must also be available. We recommend a visit to campus by applicants, where possible.

Students may be accepted and graduate credit earned by students holding Regular, Conditional, or Non-degree status according to graduate admissions policy. **However, graduate degrees are awarded only to students holding Regular Admission Graduate status**. This status is conferred when a student has fulfilled all requirements for admission to both the OGPS and to the specific program within the Department, and has been recommended by the Department for admission to the OGPS. Any "Conditional Admission" criteria must be satisfied prior to graduation.

Conditional acceptance status may be assigned to a student who, for some reason, is not qualified for Regular Graduate status. It may be that the student lacks prerequisites for the program, did not file all necessary transcripts, has a low cumulative undergraduate GPA (i.e., less than 3.0), or has some other deficiency. Specific requirements for removal of Conditional status and elevation to Regular status will be established in consultation with the major advisor and Director of Graduate Studies prior to acceptance and will be included in the acceptance letter from the OGPS.

Non-Degree status is for students who do not intend to pursue a degree program or who are not yet ready to apply to a degree program. **Note:** no more than 12 credit hours of graduate credit earned while the student has Non-Degree status may be applied toward a graduate degree. Also, please understand that students who have completed hours while a non-degree student and who have fully completed application procedures for Regular Admission status **are not** assured admission to the graduate program of the Department. They must be considered for admission along with all other applicants.

GRADUATE PROGRAM COMMITTEE (GPC) OF THE DEPARTMENT

Oversight of graduate studies in the Department resides with the Biology Graduate Program Committee (GPC), the Associate Chair/Director of Graduate Studies in Biology (aka Biology Graduate Program Director), and the Biological Sciences Department Chair. The GPC is chaired by the Director of Graduate Studies. GPC membership includes appointed voting Faculty Members of the Biology Department (defined on Page 8), and a Graduate Student Member with voting rights (including admissions decisions) who is recommended by the Biology Graduate Student Association (BGSA) and approved by the GPC Chair. The GPC membership may also include a Postdoctoral Researcher with voting rights (including admissions decisions) who is recommended by faculty or postdoctoral researchers of the Biology Department and approved by the GPC Chair.

The GPC is responsible for periodic review of policies and procedures concerning the graduate programs of the Department. Revisions to policies and procedures are subject to approval by the Department Chair, ratification by the faculty, and final approval by the University Graduate Program Committee and Dean of OGPS. The Director of Graduate Studies is also responsible for monitoring the timely completion of degree requirements as outlined in the student's Program of Study and this Handbook in conjunction with the student's Major Professor and Advisory Committee.

Admissions are overseen by the GPC, which recommends admission of applicants to specific programs, and recommends to the Department Chair candidates for different types of financial support, such as Graduate Teaching Assistantships, Graduate Research Assistantships, and Fellowships. Applications for admission are normally reviewed in the Spring Semester. Although applications for the following fall semester can be submitted as early as August 1 of the previous year, the department has the following deadlines: December 2(early), January 15(recommended) and February 15(final) for admission the following Fall. Although not typical, applications may be considered for Spring admission if submitted by **October 15th** with the permission of the Biology Graduate Program Director. **In addition,** early application in the Fall semester (preferably by October 15th) may be necessary for consideration for some forms of financial support (e.g., Presidential Fellowship Program). Applicants for Spring admission will be directly compared to those in the Fall semester to ensure they meet the same admission standards. The Department Chair, in consultation with the Director of Graduate Studies, balances committee recommendations with overall curricular and programmatic needs of the Department.

GETTING STARTED

Several items require attention of new Graduate Students upon their arrival. These and more will be covered at required Fall orientation programs of OGPS and Department.

• **Graduate Assistantships and Fellowships**. Most Biology graduate students are offered some type of financial aid as part of their admission. Common sources of financial support are Graduate Teaching Assistantships (GTA), Graduate Research Assistantships (GRA), and Fellowships. All are competitive,

and all pay a living stipend, as well as provide tuition remission and health insurance coverage. If you have been awarded a GTA, GRA or Fellowship, please read the policy handbook to understand your rights and responsibilities.

• **University ID card:** After registering for classes, your photo ID (JacksCard) can be obtained by visiting the JacksCard office. There is a $30 fee associated with acquiring this card.
• **E-mail:** All official NAU correspondence must be sent through a student's NAU e-mail (please don't expect us to use another account you may have for personal use). You will be kept informed of issues, topics, meetings, funding opportunities, deadlines, workshops, etc., important to your graduate student functions in the department and university through your NAU email. An NAU e-mail user ID will be created for you upon matriculation. To set up your e-mail password, go here or call the Student Technology Center at 523-9294 if you need assistance.
• **Mailbox:** Graduate students in residence will have a mailbox in the department mailroom. See the department office staff. The Biology office and Biology mailboxes are located on the second floor of the Biological Sciences building, building 21.
• **Office space:** Teaching Assistants have priority for shared departmental office space outside research labs. This space will be assigned by Biology Office staff. Consult with your Faculty Advisor regarding desk space and phone in her/his research area.
• **Photocopies:** See the department office staff for current procedures.
• **Keys:** Biology, Science Lab Facility and Wettaw Building keys are handled by office staff through key request forms found here.
• **New Hire Packet:** If you are supported on a Graduate Teaching or Research Assistantship, you will need to complete a "New Hire Packet". This can be located via the Human Resources website.
• **Parking:** Permits to park on campus are purchased at Parking Services in the Centennial Building (#91) or online.
• **Pay Day:** Alternate Fridays are pay days. Direct deposit is encouraged. Your pay statement is on-line through the Human Resources web site
• **Arizona Residency Status:** Individuals who come to Arizona for education will usually not qualify as a resident under current policy. Please note that if you hold a 20 hr/wk (i.e., "full time") Graduate Research Assistantship, Graduate Teaching Assistantship, or most Graduate Fellowships (check on your particular fellowship), you have full tuition remission even without AZ resident status. However, if at some point you leave a position as GTA or GRA for a part-time University position while still a graduate student, you lose the tuition benefits and will be required to pay in-state or out-of-state tuition.

FACULTY ADVISOR

Throughout your studies you will work most closely with your Faculty Advisor ("major professor"). This relationship will be established by mutual agreement based on your shared interests and available resources. Your Faculty Advisor is designated prior to your arrival, and this advisor will ordinarily be permanent; however, the student may change advisors if deemed appropriate after consultation with the current advisor, the potential advisor, and the Director of Graduate Studies in Biology. It is imperative that you work closely (and communicate often) with your Faculty Advisor to plan your program of study to ensure degree requirements are met in a timely manner and in accordance with the policies of the Department and University.

Faculty Advisors will have individual expectations or lab policies for students training in their research program. You should discuss these right away with your advisor so that you both have a clear starting point, realizing that changes may evolve as your graduate program develops. Regular, clear and open communication can prevent misunderstandings with your advisor (and your Graduate Advisory Committee). Mutual clarity in expectations is very important; do not disregard topics such as:

- mutual expectations of you as a trainee and your advisor as a mentor,
- good practice and ethics in scientific research (RCR),
- animal care and use regulations (IACUC),
- human subjects and associated regulations (IRB),
- safety and other required training for handling radioactive and/or hazardous materials,
- maintenance of data notebooks, and ownership of data and other research materials,
- order of authorship on future manuscripts and presentations,
- financial support: stipend (amount & years), travel to meetings, supplies, etc.
- post-degree letters of reference/recommendation and assistance with placement.

GRADUATE ADVISORY COMMITTEE COMPOSITION

The OGPS's policies on **minimal** composition of Graduate Advisory Committees are:
a) three **faculty** for master's committees (one of the three can be from outside the home department);
b) four **faculty** for doctoral committees (one of the four must be from outside the home department).

A **majority** of members of a Graduate Student Advisory Committee for the M.S. degree must be faculty with **voting status** in the Department of Biological Sciences. Two of the four members of the Graduate Student Advisory Committee for the Ph.D. must be faculty with **voting status** in the Department of Biological Sciences. Biology faculty holding the following titles have voting status: Assistant, Associate and Full Professor (tenured or tenure track); Assistant, Associate and Full Research or Teaching Professor or Professor of Practice.

Faculty Emeriti and Adjunct Faculty of the Biology Department are considered "inside" the department for the purposes of a Graduate Student Advisory Committee.

Non-faculty (e.g., persons from agencies or independent research organizations with relevant experience or skills) may serve on committees as long as the structure of the committee meets OGPS requirements.

For doctoral advisory committees, several additional OGPS policy statements are included in the handbook section entitled "DOCTOR OF PHILOSOPHY DEGREE (Ph.D.)"

MASTER OF SCIENCE DEGREE IN BIOLOGY (M.S.)

Faculty Advisor and Graduate Advisory Committee:
A Faculty Advisor for a student is selected at the time a student is admitted into the M.S. program. The student, Faculty Advisor, and the GPC participate in the process. The advisor and student then arrange a class schedule for the first semester. As indicated earlier, it is possible for the student to change advisors after consultation with the current advisor, the potential advisor, and the Biology Graduate Program Director.

During the first semester in residence, a Graduate Advisory Committee should be formed by the student. The graduate student, in consultation with the advisor, should select a group of potential committee members who can best advise the student in the chosen area of research. The student should then discuss her/his plans with these faculty members to determine their willingness to serve on the Graduate Advisory Committee. The committee is composed of at least three members: the Faculty Advisor and two other faculty members, with at least one of the latter being from the Department of Biological Sciences.

First Committee Meeting:
For students entering the program in the Fall semester, a committee meeting should be held before the end of November. For students entering in the Spring semester the first meeting should be held before the end of April. All students must ensure that advisory committee meetings are confirmed one month ahead of the scheduled date. The first meeting is to plan a program of courses and discuss a thesis prospectus. This prospectus provides the committee with the following information:

- The major questions or hypotheses to be addressed
- The significance of these questions
- The extent of current knowledge in the area of research
- The materials and methods to be used to answer the questions
- The schedule for completion of stages of the work

Students should take BIO 503, Elements of the Scientific Endeavor, during their first semester. Preparation of a research prospectus is a main outcome of this course. Before the first meeting of this committee, the student, in consultation with the Faculty Advisor, should complete a draft of the **Master of Science Program of Study** (POS) form that will be shared with the advisory committee. The form is available on this webpage and should match the year you entered the graduate program.

Copies of the POS Form should be provided to each committee member **before** the meeting. The Graduate Advisory Committee will provide recommendations on coursework to the student. After the POS is complete and signed by the student, advisor and Graduate Program Director, a copy will be placed in the student's electronic file with the Biology Office. Please make copies of this form for yourself, your major professor, and your committee. Changes to your Program of Study Plan must be approved by your advisor, committee members and Biology Graduate Program Director. This form is not submitted to the OGPS for their review until a student is ready to apply for graduation. For this reason, it is important that the POS be submitted to the Biology Graduate Program director to make sure that requirements are being met.

Subsequent Meetings and Annual Review
Students will arrange a meeting of the Graduate Advisory Committee at least once per academic year in order to assess progress, discuss research results, and consider future research or plans for degree completion. All students, after their first year in a program, must arrange for an advisory committee meeting in the fall semester. Preparation for the meeting involves a full report of the past year's research, including analysis of data and a well-developed plan of research for the next year. Subsequent committee

meetings are critical for the assessment of student progress by the advisory committee. Progress is reported to the Graduate Program Director in December of each year by the faculty mentor to determine eligibility for GA support.

If progress is unsatisfactory, the student will be given a warning and may be placed on academic probation; an improvement plan will then be agreed upon and signed in consultation with the student, advisory committee, and Graduate Program Director. The underperforming student will be given one semester to improve their performance. If progress remains unsatisfactory upon re-evaluation and no extenuating circumstances explain the situation, the Department may recommend dismissal from the degree program and/or may recommend removal of financial support (GA, Fellowships, Tuition Waivers, etc.). Students in this situation have recourse to university grievance procedures.

Course Requirements:
Students in the M.S. program must complete a minimum of 32 credit hours to earn their degree. The department requires that all incoming graduate students take two courses, preferably during their first year, BIO 503 and BIO 504. BIO 503, *Elements of the Scientific Endeavor*, is a depth course introducing students to research. BIO 504, *Pan-Biology*, is a breadth course taught by a team of Biology faculty that identifies fundamentally important research areas across biological disciplines. In addition, students must take one 3 credit hour course that trains students to apply quantitative reasoning, mathematical, and statistical tools in data analysis and interpretation. Courses that meet this requirement are listed in Appendix B. A minimum of 3, but not more than 6 units of Thesis (BIO 699) may be applied toward the degree requirements. However, there is no limit on the number of credit hours of BIO 699 that may be taken if needed for continued work on a thesis. As part of the 32 hours, a student may take no more than two 400-level courses. An approved program of study may include up to 12 combined hours of BIO 685 (Graduate Research) and/or BIO 697 (Independent Study) toward the degree requirements.

To earn a master's degree at Northern Arizona University under the thesis option, students must complete at least 18 units of formal, letter-graded coursework. No 400-level courses may be used toward this 18-hour formal coursework requirement.

Petitions for exceptions to the program of study stated on the Master of Science Program Form must have prior approval and bear the signatures of the student's advisor and Biology Graduate Program Director. If the student's Graduate Advisory Committee determines a student to be deficient in some area(s), undergraduate courses to correct the deficiency may be required. Undergraduate courses required by a student's committee to correct deficiencies (except for the above-mentioned two 400-level classes) are not to be included in the required 32 graduate credit hours for the M.S. degree. All matters concerning change in program plans require approval by the Biology Graduate Program Director.

Students are expected to complete courses listed on their program before taking non-required courses. Students should not enroll in courses during the summer, other than for research or thesis credit, without the explicit consent of their Graduate Advisory Committee. The tuition waivers associated with TAs or RAs only apply to courses taken during the academic year.

Seminar Requirements:
All graduate students are expected to attend general departmental seminars while in residence unless they have a verified course or teaching conflict. All graduate students without such conflicts are expected to enroll in BIO 698 – Department Seminar for 1 credit hour. Enrollment in BIO 698 – Departmental Seminar is expected every semester, but required for two semesters of the M.S. program. The reason for this requirement is that the exposure to a wide range of ideas and the opportunity to meet and interact with

other scientists is a valuable experience for graduate students, both when the speaker is in one's own field and when she/he/they are not. Furthermore, all members of the department, including graduate students, have a professional responsibility to show interest in speakers whom the department has invited to present their work, and to be involved with entertaining the visitor.

Students may also take other BIO 698 courses that may be included in the 9-semester-hour requirement to maintain full-time status and in the 32 hours of course work required for the M.S. Degree.

Research Requirements and Thesis:
M.S. students must submit a thesis based on original research and must complete between 3 and 6 credit hours of Thesis (BIO 699). The student must be continuously enrolled from the time they begin their thesis work until they defend their thesis and graduate unless they apply for and are awarded a formal leave of absence. Once a student begins enrolling in BIO 699 for preparation of the thesis, they must enroll in that course every semester until they graduate. Please see the Continuous Enrollment Graduate policy for details.

The thesis should be of such quality that major portions of it are publishable in a national research journal in the field of study. Writing the thesis as a research paper or papers for submission to a specific journal is strongly recommended. For format guidelines, please go here.

The Electronic Thesis and Dissertation (ETD) Coordinator of the OGPS is your source for current thesis requirements in terms of format, style and deadlines, the "format check," and Electronic Thesis/Dissertation filing. The Format Editor is available through the OGPS offices and online at the link above.

It is the student's responsibility to be familiar with the OGPS's standards for finishing their master's thesis. Plan ahead to make sure you **meet ALL of the deadlines**, including the Application for Graduation, Thesis Format checks, and defense scheduling. Before the thesis is submitted to your Graduate Advisory Committee, it must have been reviewed by your Faculty Advisor, revised by you, and approved by the Faculty Advisor. The initial submissions of the thesis to the committee should be made well in advance of the Final Oral Examination (~two weeks) in order to allow for further revisions based upon the committee members' recommendations. The thesis, in as close as possible to a final form (including all figures, tables, and references) must be distributed to all committee members at least seven working days before the date of the Final Oral Examination. Any committee member who considers the thesis needs significantly more work may demand that the Final Oral Examination be rescheduled. If the entire committee concurs, then a new date for the oral will be set at that meeting.

M.S. students are required to present results of their research in a formal presentation to a departmental group or at a scientific meeting. When possible, the final oral exam (see below) should be held immediately following such a presentation.

When the thesis is approved, you must follow the rules of the OGPS for Electronic Publication of the Thesis/Dissertation described here.

You must submit the final approved electronic copies of your thesis or dissertation to the OGPS during the same semester that you successfully defended by the deadline listed here. If you do not meet this deadline for final thesis submission, you must register for a minimum of 1 credit of Thesis (BIO 699) each semester after your defense until you submit your final copies to the OGPS.

Final Oral Examination (Thesis Defense)
Each student will take this examination. It is designed to test a student's knowledge in biology **and** competence in research, as well as the adequacy of the thesis. The examination is given by all members of the student's Graduate Advisory Committee. This exam typically lasts 2–3 hours, with about half the time devoted to knowledge in biology and about half to research and thesis.

In preparation for this examination the student must observe the following points:

- A copy of the thesis in virtually final form must be distributed to all committee members at least seven working days before the date of the examination.
- The date for the examination must be arranged by the student so that all members of the committee can attend. Such a date must fall within the Fall or Spring semesters (excluding Final Examination Week), and faculty must have a confirmed time, date, and place in writing from the student. Please pay attention to all deadlines posted by the OGPS: for the semester in which you wish to graduate.
- Students must be enrolled during the semester in which they submit the thesis for at least 1 credit of BIO 699.
- The **Application for Graduation** should be completed by the deadline listed here. This deadline, and the application and instructions for the application are available here.
- With meetings of your Graduate Advisory Committee scheduled each academic year, each member should be familiar with the research progress and with early drafts of the thesis. Frequent consultation with your advisor and committee members is encouraged throughout your research and preparation of the thesis.
- Prior to the Final Oral Examination, the student will provide to each committee member a list of courses taken for the M.S. degree; i.e., a current copy of your approved Program of Study (POS).

Questions in the final oral examination will evaluate the candidate's understanding of the basic principles of biology and specific aspects of the designated discipline. Questions on research and thesis may relate to points of clarification, analytical procedures, basic biology and systematics of the species studied, possibilities for future research and publication, and areas where research could be improved. Each committee member will keep notes on all questions asked, record satisfactory or unsatisfactory for the answer, and make a general summary of the student's performance. A pass or fail vote is recorded by secret ballot before any discussion. A student must obtain at least two-thirds of the votes in favor of passing the oral exam and accepting the thesis. The Chair of the Graduate Advisory Committee (the Faculty Advisor) will report the result of this exam in writing to the Biology Graduate Program Director and to the Dean of the OGPS on the Final **"Oral Defense Form (Parts 1 and 2)"** that the candidate's advisor should obtain from the OGPS prior to the defense under thesis and dissertations here.

If the final oral examination is failed it may be repeated only once.

Evaluation of Progress and Grade Requirements:
The student's Graduate Advisory Committee will meet to evaluate the student once each year. In addition, the Registrar and OGPS will monitor student transcripts on a continuing basis and evaluate all students for Satisfactory Academic Progress. A student is expected to maintain a grade point average of B or better throughout the course work for the M.S. degree, and to make significant progress in research each semester.

Students with, or applying for, financial support must maintain a grade point average of 3.00 or better. Students are expected to complete courses listed on their approved program plan before taking other courses.

No more than 6 credit hours of course work with a grade of "C" may be used toward the M.S. degree requirements. Accumulation of 6 credit hours of graduate course work with a "C" grade, or earning any grade below a "C" in a graduate class, will result in the student being placed on Academic Probation by the OGPS.

A student placed on probation will not be permitted to register for classes, may lose their financial aid eligibility, and must meet with their advisor to discuss the steps necessary to remediate problems that led to probation. This meeting should result in a written action plan describing the remediation steps to be taken. The plan must be signed by the student, the advisor, and the Biology Graduate Program Director, who will then send it to the OGPS for final approval. If the plan is approved by the OGPS, the registration hold will be lifted and the financial aid hold may be modified. Successful completion of the plan in subsequent semesters will return the student to Good Academic Standing.

If a student does not meet the terms of their approved action plan in the following semesters, or fails a second time to maintain Good Academic Standing, one or both of the following actions will be taken:

- The Biology Department may initiate academic dismissal by notifying the student and the OGPS in writing of the program's intent to recommend dismissal.
- The student will be blocked from future enrollment.

A terminated student may petition the OGPS for readmission based on their individual circumstances. It is the student's responsibility to articulate their case and explain why an exception is warranted.

Time Limits

You must complete all requirements for the M.S. degree within a 6-year period, including time as a non-degree seeking graduate student if you are applying courses taken as a non-degree student to your Program of Study (POS). If you take courses from other institutions and transfer them to your program at NAU, they must also be taken within the 6-year period.

An extension of the time to complete degree requirements (of up to one year) may be granted if there are compelling extenuating circumstances. Extensions may be granted for a variety of reasons which may include, but are not limited to, job relocation, military duty, pregnancy, illness, a serious accident, divorce, or other personal tragedies within the immediate household.

If you wish to petition for an extension of the 6-year limit, you must request an extension using the extension of time form (available here). Your advisor and the Biology Graduate Program Director must support your petition by signing the form.

Credit earned at Northern Arizona University at a date prior to the six-year period in which the degree is earned may be used for the degree if approved by the Faculty Advisor and Biology Graduate Program Director. Faculty within a graduate program/department assume the responsibility to ensure these courses demonstrate the current core learning competencies, expectations, and criteria for the student's degree or certificate program. The age of the course work under consideration, or the year taken, may be a factor in the decision as to whether or not the coursework is applicable to a graduate student's program. Please see Transfer Credit – Graduate Students for more information.

Credit Load
To be considered a Full-Time Graduate Student, you must **carry 9 graduate credits** per semester (Fall & Spring). Students on graduate assistantships or fellowships (20 hours per week employment) are required to carry 9 (and no more than 12) credit hours to qualify for their GA employment.

DOCTOR OF PHILOSOPHY DEGREE (Ph.D.)

Policy Statements
The general NAU University Policy Statements for Ph.D.-seeking Graduate Students may be found here. Applicants and new Ph.D. students should also refer to the relevant section on the Biological Sciences Department website. The Biology Ph.D. requirements equal or exceed the baseline NAU Ph.D. requirements, so please read University, College and Biology Department policies and requirements carefully. **Students are responsible for understanding and meeting all Ph.D. requirements to earn their Ph.D.** See Table 1 for the OGPS Checklist for graduation and how it corresponds to the checklist for Biological Sciences.

The Ph.D. Program
The Department of Biological Sciences seeks to provide a collegial and stimulating intellectual environment for graduate students pursuing the Ph.D. degree, and for that reason admission to the program is highly selective. The Graduate Program Committee and prospective faculty mentors will evaluate suitability for admission based on Grade Point Average, letters of recommendation, past research experience, and personal statement. In general, the GPC will assess the applicant's demonstrated promise for independent research development, design, interpretation and presentation. Criteria, for example, may include previous research experience, research presentations at professional conferences, authorship of peer-reviewed publications, and letters of recommendation that address directly the applicant's potential for research success. A Master's degree is not required for direct entry into the Ph.D. program.

In-Residence Master's Students
At the request of the graduate research Faculty Advisor, a student in the master's degree program can be considered by the Graduate Program Committee for admission to the doctoral program prior to completion and successful defense of a M.S. thesis. Standards for transitioning to the Ph.D. program will be comparable to those required for direct entry, as described above.

Faculty Advisor and Dissertation Committee
A Faculty Advisor (Major Professor) for a student is selected at the time a student is admitted into the program. The student, Faculty Advisor, and the GPC participate in the process. The advisor and student then arrange a class schedule for the first semester. It is possible for the student to change advisors after consultation with the current advisor, the potential advisor, and the Biology Graduate Program Director.

During the first semester, a Dissertation Committee (a.k.a. Graduate Advisory Committee) must be formed. The four-member committee is composed of the Faculty Advisor (Chair), at least one other voting faculty member from the NAU Biology Department, and one to two faculty members from outside the department. Adjunct Faculty may serve as "inside members" of the four-member committee. A fifth committee member may be included if considered desirable by the student and the committee. In any case, an equal or majority of members of the Dissertation Committee must be voting members of the NAU Department of Biological Sciences. For example, a four-member committee must have at least two members of the Department of Biological Sciences and a five-member committee must have at least three members of the Department of Biological Sciences.

Role of the Outside Member of the Dissertation Committee
All dissertation committees must include a faculty member from outside the department where the student is receiving a degree. The role of the outside member is to provide a broader perspective on the topic under study and/or to provide additional expertise on the committee. The outside faculty member should possess relevant methodological or theoretical expertise, or an established record of publication and/or other forms of scholarship.

The purposes for including an outside faculty member on a dissertation committee include:

- to provide the degree candidate with a wider group of resource people for their dissertation research and writing;
- to promote interdisciplinary interaction among faculty and students;
- to promote interdisciplinary aspects to work produced to fulfill "discipline-based" graduate degree requirements.

Formal Appointment of Doctoral Committee
Once the student and Faculty Advisor have decided who should be on the Dissertation Committee, and the committee members have been contacted and have agreed to serve, the student and major professor must download, complete, and submit to the OGPS, the Dissertation Committee Recommendation Form.

The recommendation will be reviewed by the OGPS Dean, or designee, who will formally appoint the doctoral committee if it is properly constituted. In cases where a committee member will be away from campus for some time, such as on sabbatical leave, a substitution for that member must be named (using the same procedure as for forming the original committee) as soon as possible after the impending absence becomes known. The OGPS will send a memo to the student and all members of the committee, once that committee has been approved.

For students entering the program in the fall semester, a committee meeting should be held by the end of November of this first semester in order to plan a program of courses and review a dissertation outline. For students entering in the spring semester, the meeting should be held by the end of April of this first semester.

First Committee Meeting
All students must ensure that advisory committee meetings are confirmed approximately two weeks ahead of the scheduled date. Before the first meeting of the Graduate Advisory Committee, the student should complete all portions possible of the **Ph.D. Program of Study (POS) form,** available here, in consultation with the Faculty Advisor. **Copies should be provided to each committee member before the first meeting.** The form will serve as a timetable to evaluate progress of the student toward the degree. The student's program must be approved by all committee members and by the Biology Graduate Program Director. After the POS form has been signed by all responsible parties, students should (a) submit the signed, scanned form to AskBioGrad@nau.edu for their departmental file and then (b) upload a copy into the “Milestones” section of their Louie file for the use of the OGPS. Please keep copies of this completed form for yourself, so they can be shared as necessary, particularly if changes are made, with your advisor and each committee member.

Before the student's research begins (within the first academic year or before the first research season), a Dissertation Prospectus (Research Plan) must be submitted to the advisory committee by the student. The Prospectus should document a student’s active engagement in development of a research project, as well as their developing understanding of their chosen field of research.

Endorsement of the dissertation prospectus **(**Approval Form for Prospectus) by the Faculty Advisor and Graduate Advisory Committee eventually becomes a part of the student's advancement to candidacy. The prospectus will become part of the written comprehensive exam and must be completed prior to the oral exam. Students are required to enroll in BIO 503 during their first semester; BIO 503 is optional however for Ph.D. students entering the program with an M.S. Preparation of a prospectus is a key assignment in that course.

The prospectus provides the committee with the following information:

- The major question(s) to be addressed
- The significance of the research
- The extent of current knowledge in the area of research
- The materials and methods to be used to answer the question(s)
- The timetable of anticipated completion of stages of the work.

Subsequent Meetings

Students will arrange a meeting of the Graduate Advisory Committee at least once per academic year in order to assess progress, discuss research results and/or future research plans. (Although one meeting per year is the minimum, it is best to keep the committee updated often on your efforts and any changing plans.) All students, after their first year in a program, must arrange for an advisory committee meeting in the fall semester of each year. Preparation for the meeting involves a full report of the past year's research including analysis of data and a well-developed plan of research for the next year. Progress is reported to the Biology Graduate Program Director in December of each year by the faculty mentor to determine eligibility for GA support. The mentor will state clearly if satisfactory or unsatisfactory progress has been made and the basis for this conclusion. If progress is judged to be unsatisfactory, the student will be given a warning, may be placed on Academic Probation, and then given one semester in which to improve this status. If progress remains unsatisfactory, the student may be recommended for dismissal from the degree program and any future appointment with financial support.

Course Requirements:

Developing an appropriate set of courses for the student's career objective(s) rests with the Faculty Advisor, Graduate Advisory Committee and the student. To be able to comprehend, discuss and potentially teach in a variety of areas in biology, a student's breadth of knowledge in the major principles of biology should be assured by the approved course plan for the Ph.D. In addition, students identify an area of emphasis and complete courses from the NAU offerings to bolster their in-depth understanding. Typical areas of emphasis include ecology, genetics, evolution, physiology, morphology, cell biology, microbiology, etc. Graduate courses offer contemporary material from primary sources and include a rigorous writing component. The proximate goal of the doctoral course plan is to increase awareness of where resource materials of biology sub-disciplines are found and to prepare students to teach introductory and specialty courses in their area(s) of study. The ultimate goal is to expand the biological perspective of students so that they can conceptualize ideas with a broader base of knowledge and identify potential interdisciplinary research questions.

The Biology Ph.D. requires a minimum of 60 credit hours taken beyond the bachelor's degree, as follows:

1. A minimum of 15 hours must be Bio 799 (Dissertation). Bio 799 credits are normally taken during the latter half of your doctorate studies after advancing to Candidacy, and at least one credit of 799 must be taken during the semester you defend your dissertation and graduate. Additional hours of Bio 799 taken beyond 15 credits do not count toward the 60 credits needed for graduation, but do count toward your semester credit load for determining full time status (9 credits/semester = full

time). Graduate students are also required to maintain continuous enrollment in 799 from the start of their enrollment in dissertation credits until the successful completion of a defense. Please see the Continuous Enrollment, Graduate policy for more details.

2. The department requires that all Ph.D. students take three BIO courses: **BIO 503, BIO 504** and **BIO 537**. BIO 503, *Elements of the Scientific Endeavor*, is a depth course introducing students to research and should be taken during the student's first semester. ; BIO 503 is optional however for Ph.D. students entering the program with an M.S. BIO 504, *Pan-Biology*, is a breadth course taught by a team of Biology faculty that identifies fundamentally important research areas across biological disciplines. In addition to BIO 503 and BIO 504, Ph.D. students are required to take BIO 537, Grant Writing. As part of this course, students prepare a grant proposal including all components (narrative, budget, etc.). The proposal must be an independent endeavor on the part of the student; it should not be jointly written with the Faculty Advisor. If the proposal involves a study closely related to what has already been written, the student must be able to demonstrate that the proposal is significantly different and innovative relative to any existing proposal. The Grant Writing course also introduces students to the grant proposal review process, with students providing peer reviews of each other's proposals.
3. All Ph.D. students must take a minimum of one 3 credit hour course in which they learn how to apply quantitative reasoning, mathematical, and statistical tools in data analysis and interpretation. Completion of at least one quantitative course is necessary as a research skill for advancement to candidacy if a foreign language translation exam is not completed. A list of appropriate courses is listed in Appendix B.
4. **Seminar Requirement:** The program of study of each doctoral student must include a minimum of two (2) Biology departmental seminars (BIO 698 departmental seminar and one topical or presentation-based BIO 698 course. Graduate students are expected to attend all department seminars (the specific day of the Department Seminar may vary between semesters), but they must enroll in BIO 698-departmental seminar at least twice during their Ph.D. degree program. The exposure to a wide range of ideas and an opportunity to meet and interact with other scientists is a valuable experience for graduate students, both when the speaker is in one's own field and when she/he is not. Furthermore, all members of the department, including graduate students, have a professional responsibility to show interest in speakers whom the department has invited to present their work, and to be involved with entertaining the visitor. At present, we offer one semester hour of BIO 698 credit for the Department Seminar, and all graduate students should enroll for that credit unless the time conflicts directly with course or teaching duties. BIO698 courses on other topics also count towards the 45 hours of required coursework for the Ph.D. degree.
5. The remaining credit hours must be approved by the Faculty Advisor, Graduate Advisory Committee and Associate Chair for Graduate Studies. Within the 45 credits of non-dissertation (BIO 799) coursework, a minimum of 37 credit hours must be at the 500-level or higher, and only up to 2 courses at the 400-level may be used toward the degree, if approved by the faculty advisor. If 400-level courses are not used as part of the formal coursework, the remaining units must be 500-level or above. As approved by the Faculty Advisor and Graduate Advisory Committee; Biology Graduate Program Director; and the OGPS, graduate course credits completed for a Master's degree may be applied toward the doctoral program. An approved program of study may also include up to 12 combined credit hours of BIO 685 (Research) and/or 697 (Independent Study) that count toward the Ph.D. degree requirements. Additional hours of 685/697 taken beyond the combined total of 12 credits do not count toward the degree requirements, but do count toward semester credit load for purposes of determining full time status (9 credits per semester = full time).

6. Courses in cognate fields such as, but not restricted to, chemistry, geology, mathematics & statistics, forestry, paleontology, computer programming, engineering, etc. may be included in the course plan.

Synopsis of Ph.D. Course and Credit Hour Requirements:

- A minimum of 15 credit hours of BIO 799, Dissertation.
- At least 45 credit hours approved by the Faculty Advisor, Graduate Advisory Committee, and Director of Graduate Studies, including BIO 503, BIO 504, BIO 537 and one quantitative course such as STA 570 (see Appendix B for all courses on campus that will fulfill this requirement). A minimum of 37 credits must be at the 500-level or higher and only 2 courses at the 400-level may be used toward the degree. An approved program of study may include up to 12 combined credit hours of BIO 685 and/or 697 toward the degree requirements.
- Two one-credit, BIO 698 sections of departmental seminar and one additional seminar focused on a particular research topic or one emphasizing research presentations and critique. Attendance at all departmental seminars is expected and will be monitored for grading purposes if the student is enrolled in BIO 698 – Department Seminar.

Research Requirements:

The Ph.D. degree requires a demonstration of considerable independence, research skill and experience in a discipline within biology. The choice of a problem and research area is made in consultation with the Graduate Advisory Committee. Development of techniques, design of experiments, collection and analysis of data, reporting of results in written and oral form, and preparation of research proposals are all skills that should be mastered in this degree program. The dissertation must demonstrate that the student has mastered his/her field of specialization, has carried out independent scholarly work, and has contributed new knowledge.

Application for and Admission to Candidacy

Please see the "Requirements for Doctoral Degrees: Ph.D." for OGPS requirements for candidacy. Below are details and requirements specific to the Department of Biological Sciences pertaining to certain aspects of the candidacy process:

Comprehensive Evaluations

The Written and Oral Comprehensive evaluations are designed to assess the student's breadth and depth of knowledge in biology, as well as their analytical ability, innovation, and critical reasoning skills. Upon successful completion of the Comprehensive Evaluations the students should be fully qualified to proceed into the final, intensive, research phase of their degree program with the tools necessary to be successful in their professional activities.

Both the Written and Oral Comprehensive Evaluations must be passed to advance to Candidacy. A student who is making satisfactory progress toward the Ph.D. degree must have completed the Comprehensive Evaluations by the end of his/her fifth semester. A student may be placed on academic probation for lack of satisfactory progress toward the Ph.D. As stipulated by the OGPS, Advancement to Candidacy also requires that students have completed all of their coursework except for BIO 799, dissertation.

Written Comprehensive Evaluation

The Written Comprehensive component will help develop (and reflect) the student's ability to critically review the primary scientific literature and creatively express her/his interpretations of the subject matter. In addition, the student will reinforce skills in formulating and presenting an independent research proposal.

The written comprehensive exam for the Biology Ph.D. degree consists of the successful development of a Preliminary Dissertation Prospectus that is sufficiently detailed to (i) document the student's active engagement in a developing research project, and (ii) document the student's developing understanding of the chosen field of research.

The written exam (in the form of a preliminary prospectus) must be successfully completed (as judged by the committee) prior to the oral exam, which will cover the prospectus as well as background knowledge as directed by the committee. Both the written and oral components of the comprehensive exam must be completed no later than the 5th semester of a doctoral student's program. Failure to complete both components of the comprehensive exam by this deadline will result in an "unsatisfactory progress" notation by the Biology Graduate Program Director. In cases where exceptional circumstances exist, exceptions to this deadline will be considered on a case by case basis by submission of a petition to the Graduate Program Committee.

Requirement for Passing and Reporting Written Comprehensive Exam Results:
To pass the Written Comprehensive Evaluation a student must obtain passing votes from at least three-fourths of the full Graduate Advisory Committee (including the Faculty Advisor). If the Written Comprehensive Evaluation is not passed, the student must convene her/his Graduate Advisory Committee to discuss the deficiencies and develop a plan for improvement. The *Report on Results of Written Comprehensive Evaluation* is available here.

Oral Comprehensive Evaluation
This evaluation provides an opportunity for students to display their knowledge in biology and in research skills. The student should be evaluated on understanding of the field and ability to bring together ideas and present them cogently in a professional atmosphere. The evaluation is given by all members of the student's Graduate Advisory Committee and lasts about 3 hours. It is taken after the student has passed the Written Comprehensive Evaluation.

The Chair of the Graduate Advisory Committee (Faculty Advisor) will organize the format of and direct the evaluation. The evaluation includes:

- a statement of rules governing Oral Comprehensive Evaluations and of the format to be followed;
- a presentation by the student (no more than 20–30 minutes) of research progress and plans (students should expect questions during the presentation);
- questioning related to the research;
- questioning on other relevant topics.

Questions frequently deal with details and concepts and principles of general biology, systematics of and literature on taxa that are the focus of the student's research, and the history, conceptual development of, and recent developments in research-related fields. When necessary, emphasis will be placed on areas in the Written Comprehensive Evaluation on which the student showed weakness.

Each member of the committee keeps notes on all questions, recording a satisfactory or unsatisfactory answer, and notes a general summary of the student's performance. A pass or fail vote is recorded by secret ballot before any discussion. To pass the Oral Comprehensive Evaluation, a student must obtain at least three-fourths of the Advisory Committee's votes in favor of passing. If the Oral Comprehensive Evaluation is failed, it may be repeated only once. A second failure will prevent admission to candidacy and continuation towards the Ph.D. degree. In order to best achieve a level of competency needed to pass this evaluation after failure on the first attempt, the student must discuss courses of action with the

Graduate Advisory Committee and Faculty Advisor. Courses of action may include directed readings after consultation with faculty and/or oral presentations that emphasize learning how to think under stressful conditions, additional course work, or other specially designed studies. Submit this form following the Oral Comprehensive Evaluation.

Whatever the course of action, the student and the Graduate Advisory Committee work to achieve an expected standard for the Oral Comprehensive Evaluation. If the student failed because of a specific deficiency the committee may elect to re-examine the student within rather narrow limits.

Teaching Requirements and Paper Presentations:
All students completing the Ph.D. in the Department must gain experience in teaching at the collegiate level. To achieve this, all Ph.D. students are required to serve as Teaching Assistants in at least one course (minimum of one laboratory section) for at least one semester. Graduate students having this experience documented at the M.S. level will have this requirement waived.

In addition, all Ph.D. students must serve as a lecturer in a section of an established course or organize and present a series of lectures/programs to K-12 students or the general public. The lectures/workshops will consist of a natural unit of two to four lectures or an equivalent experience in K-12 schools. The student must prepare and deliver the presentations in a coherent way in the presence of the course instructor or other. The student will then prepare a set of test questions based upon the presented material, and the student will receive student evaluations as well as a written evaluation by the course instructor.

Students will not be assigned to a course unless the Department Chair and the student's Graduate Advisory Committee are convinced that they are capable of excellent performance in that course. The teaching requirements may be waived if English is the student's second language and if agreed upon by the Department Chair, the Director of Graduate Studies, and the Graduate Advisory Committee. The time of this teaching experience will be decided upon one year in advance so that all scheduling arrangements can be made. The form Documentation of Teaching Experience should be submitted after this requirement is met.

All Ph.D. students are required to present scientific papers at a minimum of two meetings or conferences at the state, regional or national level. The form Documentation of conference paper presentation should be submitted following the presentations.

Together these experiences meet the Professional development requirement for advancement to candidacy as described by the OGPS here (see section 2B).

Admission to Candidacy: Admission to Candidacy means that the student becomes an official candidate for the Ph.D. degree, implying that the student is adequately prepared to undertake research independently and write a dissertation. Ordinarily, research will be well underway long before admission to candidacy is actually granted. Please see OGPS requirements for candidacy here.

The **Application for Candidacy for the Doctoral Degree** form is available here.

The requirements for admission to candidacy include:

- Approved Program of Study;
- Approved Dissertation Committee (including OGPS memo as described on p. 15);
- Completion of the Written and Oral Comprehensive Evaluation requirements;

- Completion of all coursework (minimum of 45 credits, adhering to the coursework requirements listed above) approved by the Faculty Advisor, Graduate Advisory Committee and the Graduate Program Director (plus, consideration and approval of any changes since the form was initially prepared, including removal of course deficiencies specified by your committee
- Approval of a prospectus of the dissertation;
- Completion of plans to meet the OGPS Professional Development requirement. See details of this requirement here. Ph.D. students are required to give two presentations and to lecture in a course of their choosing (or lead workshop(s) as an alternative to delivering lectures). These activities meet the professional development requirement of the OGPS as described above.

Admission to Candidacy should be obtained upon immediate completion of the above milestones and no later than 90 days before the Dissertation Defense Examination.

Once admitted to candidacy, the committee will not suggest major alterations to the student's Research Plan, although it remains the responsibility of the committee to evaluate the quality and quantity of work the student is doing within the bounds of the Research Plan.

Additional Requirements (not required to advance to candidacy)

A **review paper** is required from all biology doctoral students before they graduate with their Ph.D. This requirement can be met with the following options: the first chapter of the student's dissertation that covers the background for their Ph.D. research; introductory sections of all chapters of the dissertation if the dissertation is constructed as a series of publishable manuscripts; a stand-alone review (e.g., a meta-analysis). The approval form for the review paper is here.

Dissertation Requirements:
Dissertation requirements are outlined here and OGPS resources can be found here. The Electronic Thesis and Dissertation (ETD) Coordinator of the OGPS is your source for current dissertation requirements in terms of format, style, and deadlines, and the "format check." **Note: All Theses and Dissertations will be completed and submitted electronically** (see link above)**.** A "format check" by the Coordinator assures that the document is being prepared such that the final copies will be acceptable to the OGPS. The "format check" is required and can prevent lengthy and costly delays.

Two types of Dissertation formats are acceptable. The preferred form in this department includes a series of papers either submitted, or prepared for submission, to professional journals, with additional introductory and concluding chapters as described at the web site provided above. Alternatively, the Dissertation may follow a more traditional format and include general chapters for introduction, methods, results, and discussion. Specific format must be agreed upon by the student and Graduate Advisory Committee. The Dissertation must be of sufficient quality for publication in national or international journals, so a Dissertation following journal format are preferred for several reasons. This format facilitates publication of important research findings. In addition, students seeking employment or postdoctoral positions benefit greatly by the rapid publication of their dissertations. Professional publications demonstrate expertise in research and bring greater visibility to the author.

Before the dissertation is submitted to the Graduate Advisory Committee, it must have been reviewed by the Faculty Advisor, revised by the student, and approved again by the Faculty Advisor. The initial submission of the dissertation to the Graduate Advisory Committee needs to be made well in advance of the Dissertation Defense Examination (four to eight weeks) in order to allow for further revisions based upon the committee members' recommendations. Committee members must provide feedback on the

dissertation within two weeks if their changes are to be incorporated into the final draft of the dissertation. The dissertation, in final form, including all figures, tables, and references, must be distributed to all committee members, with a copy to the OGPS, a minimum of two weeks before the date of the Dissertation Defense Examination. Any committee member who considers that the dissertation needs more work may demand a delay in the Dissertation Defense Examination.

The Continuous Enrollment, Graduate policy outlines the timeline and requirements for submission of the approved, final dissertation. Please adhere to all OGPS deadlines to avoid unnecessary enrollment in BIO 799.

The Dissertation Defense
There are two components to the Dissertation Defense required of all Ph.D. students: the Dissertation Defense Seminar and the Oral Dissertation Defense Examination.

Dissertation Defense Seminar
The Ph.D. degree requires that each student present a formal Dissertation Defense Seminar ideally as part of the Departmental Speakers Program and open to the public. Contact the faculty chair of the Speaker's Program Committee to schedule this seminar. The seminar will last 45-50 minutes with 10 or more additional minutes for questions and discussion. This seminar must be given before the student's Dissertation Defense Examination, and students are encouraged to schedule the examination immediately after the Dissertation Defense Seminar.

Oral Dissertation Defense Examination
At the start of the semester in which a student expects to defend the dissertation, she/he must verify with the OGPS the deadline for holding a dissertation defense. No more than four years shall elapse between the Oral Comprehensive Evaluation and the Dissertation Defense Examination. If the time between examinations is longer than four years, the Oral Comprehensive Evaluation must be repeated. The Dissertation Defense Examination may not be administered prior to 90 days after the student has been admitted to candidacy for the degree.

This examination is designed to test a student's competence in research and the adequacy of the dissertation; it is a rigorous "defense" of the dissertation. The examination is given by all members of the student's Graduate Advisory Committee, and typically lasts 2–3 hours. The examination is scheduled by the student through the OGPS at least two weeks (10 working days) in advance. The Dissertation Defense Scheduling form should be used for this purpose. The Oral Defense Checklist and a “defense-ready” copy of the dissertation must be in the OGPS Office at least two weeks (10 working days) prior to the date of the defense.

In preparation for this examination, the student must consider the following points (covered in the Dissertation Defense Scheduling Form from the OGPS):

- A copy of the dissertation, in final form, must be distributed to all committee members, and to the OGPS, at least two weeks before the date of the examination.
- The date for the examination must be arranged by the student so that all members of the committee can attend. Such a date must fall within the Fall or Spring semesters, excluding Final Examination Week, and faculty must have a confirmed date, time, and place, in writing, from the student. Notification of the scheduled examination must be given to the Graduate Dean by the Faculty Advisor at least two weeks in advance. (See sign-off of the scheduling form.)
- The examination should be scheduled at least 4 weeks before the date of expected graduation in order to allow for any changes to the dissertation recommended by the committee.

- A list of courses taken for the M.S. and Ph.D. degrees should be provided to each committee member at least 7 working days before the examination.
- This examination will be devoted to questions relating to the Dissertation.
- Any member of the faculty may attend the Dissertation Defense Examination. Graduate students may attend by invitation of the Faculty Advisor. Questions will be asked by members of the student's Graduate Advisory Committee. At the discretion of the Chair, questions may be received from visitors. Each member of the doctoral committee keeps notes on performance during the examination and records a general summary of the student's understanding of the research project and defense of the thesis.
- A pass or fail vote is recorded by secret ballot before any discussion. To pass, a student must obtain at least three-fourths of the votes in favor of passing. If one committee member is absent because of an emergency, permission to continue with the examination must be obtained from the Dean of the OGPS. If permission is granted to continue with one missing member, no dissenting votes may be registered if the student is to pass. If more than one committee member is absent, the examination must be rescheduled.

The OGPS also appoints a University Graduate Committee representative to attend the final oral defense. The observer reports to the Graduate Dean on the conduct of the examination. This report is also shared with the Department Chair. If invited by the Chair of the Graduate Advisory Committee, the observer may ask questions, but the observer does not vote to pass or fail the student.

If the Dissertation Defense Examination is failed, it may be retaken only once.

Evaluation of Progress and Grade Requirements:
The student's Graduate Advisory Committee will meet to evaluate the student once each year. In addition, the OGPS monitors student transcripts on a continuing basis and evaluates all students for Satisfactory Academic Progress. A student is expected to maintain a grade point average of 3.0 or higher throughout the course work for the Ph.D. degree, and to make significant progress in research each semester.

Students with, or applying for, financial support must maintain a grade point average of 3.0 or higher. Students are expected to complete courses listed on their approved program plan before taking other courses. The advisor will report on student progress once annually following a request by the Graduate Program Director. Progress will be described by the mentor as excellent, satisfactory or unsatisfactory. An unsatisfactory rating will be followed by an explanation from the mentor to the Graduate Program Director. An improvement plan will be developed by the mentor and student in consultation with the Graduate Program Director. Students earning a satisfactory or excellent rating will be eligible for ongoing TA or RA support.

No more than 6 credit hours of course work with a grade of C may be used toward the Ph.D. course requirements. Accumulation of more than 6 credit hours of graduate course work with a "C" grade, or earning any grade below a "C" in a graduate class, will result in Academic Probation for the student. Please see the OGPS policy on Academic Probation and Dismissal.

A student placed on academic probation may not be permitted to register for classes (an enrollment hold will be placed on their account) and may lose their financial aid eligibility. Students on academic probation must meet with their advisor to discuss the steps necessary to remediate problems that led to probation. This meeting should result in a written action plan describing the remediation steps to be taken. The plan must be signed by the student, the advisor, and the Associate Chair for Graduate Programs, who will then send it to the OGPS for final approval. If the plan is approved by the OGPS Associate Dean, the

registration hold will be lifted and the financial aid hold may be modified. Successful completion of the plan in subsequent semesters will remove probation and return student to Good Academic Standing.

If a student does not meet the terms of their approved action plan in the following semesters, or fails a second time to maintain Good Academic Standing, one or both of the following actions will be taken:

- The Biology Department may initiate academic dismissal by notifying the student and the OGPS in writing of the program's intent to recommend dismissal.
- The student will be blocked from future enrollment.

A terminated student may petition the OGPS for readmission based on their individual circumstances. It is the student's responsibility to articulate their case and explain why an exception is warranted.

Time Limits
If you enter the Ph.D. program after earning an M.S. degree, you must complete all requirements for the Ph.D. degree within an 8-year period, including time as a non-degree seeking graduate student. If you take courses from other institutions, you may transfer them to your program at NAU, upon approval from the advisor, Associate Chair for Graduate Studies, and the OGPS. Faculty within a graduate program/department make the decision as to whether transfer courses will be applied to a program plan, and assume the responsibility to ensure transfer courses demonstrate the core learning competencies, expectations, and criteria for the requested transfer. If you enter the Ph.D. Program directly from your Bachelor's degree, without first earning an M.S. degree, you must complete all requirements for the Ph.D. degree within a 10-year period, including time as a non-degree seeking graduate student. Please follow this link for more details.

One extension of the time to complete degree requirements (of up to one year) may be granted if there are compelling extenuating circumstances. Extensions may be granted for a variety of reasons which may include, but are not limited to, job relocation, military duty, pregnancy, illness, a serious accident, divorce, or other personal tragedies within the immediate household.

If you wish to petition for an extension of the time limit, you must request an extension on the appropriate form (available here). Your advisor and the department chair must support your petition by signing the form, and it must be approved by the OGPS.

Credit Load
To be considered a Full-Time Graduate Student, you must carry 9 graduate credits per semester (Fall & Spring). Students on graduate assistantships or fellowships (20 hours per week employment) are required to carry 9 (and no more than 12) credit hours to qualify for their GA employment. A student must be enrolled in at least one (1) credit of Bio 799 (Dissertation) during the semester in which she or he defends, and must adhere to the policy governing continuous enrollment for graduate students.

Application for Graduation
At the start of each academic year, the OGPS announces its deadlines for filing the Application for Graduation. You must apply for graduation at least one semester before graduation is expected. The online graduation instructions are available at the OGPS website here.

CHECKLIST FOR Ph.D. STUDENTS IN BIOLOGY

The following checklist will aid your timely completion of program requirements. Please also see the OGPS's Checklist. See Table 1 for correspondence between the two checklists.

___ Formalize your Graduate Advisory Committee membership; written request to the Chair of the Department, which is forwarded by the Biology Graduate Program Director, on your behalf, to the OGPS.
___ Formalize Doctoral Degree Program plan of study with Faculty Advisor, Graduate Advisory Committee and Biology Graduate Program Director.
___ Course in Grant Proposal Writing.
___ Three BIO698 seminars, two of which must be Department Seminar; the third can be a topical seminar or a seminar organized by a research center.
___ 45 credits of course work beyond the bachelor's degree, excluding thesis or dissertation credit. No more than eight credits or 2 courses may be at the 400 level. No more than 12 credits combined may be Graduate Research (BIO 685) and/or Independent Study (BIO 697).
___ 15 credits of Dissertation Research (BIO 799).
___ Written Comprehensive Evaluation.
___ Oral Comprehensive Evaluation.
___ Approved Dissertation Research Prospectus.
___ Teaching Assistant - minimum of one laboratory section for at least one semester.
___ Lecturer - Two to four lectures presented as a unit in an established course.
___ Admission to Candidacy; must have completed all course work, etc.
___ Presentation of two papers at state, regional or national meetings, which meets the professional development requirement of the OGPS.
___ Application for Graduation – you should complete application one semester before expected graduation.
___ Dissertation format check completed by the Format Editor of the OGPS.
___ Dissertation in final form to advisory committee and OGPS (check deadlines).
___ Dissertation seminar presented to Department & public in conjunction with the oral defense.
___ Oral Dissertation Defense Examination.
___ Dissertation revisions made.
___ Final dissertation copies submitted to the OGPS as described above.

Table 1: OGPS checklist for Graduation (Ph.D.) and corresponding checklist for Biological Sciences. Gray highlighted rows indicate equivalent steps across the Grad College and Biology.

Grad College checklist	**Biology checklist**
1. Admission to Regular Status (if originally admitted provisionally)	
2. Meet with your adviser and develop your Program of Study.	1. Formalize your Program of Study; send request to chair; Grad program director forwards to Grad College
• transfer credit (if applicable)	
3. Select your doctoral dissertation committee.	2. Formalize your dissertation committee
4. Complete your coursework and residency requirements	3. Complete the following coursework:
	-- BIO 503: Elements of the Scientific Endeavor
	-- BIO 504: Pan-Biology
	-- BIO 537: Grant Writing
	-- BIO 698 (Three total: two are Departmental Seminar, third can be topical or a seminar organized by a research center)
	-- 45 credit hours beyond the bachelor's excluding dissertation credit.
	-- BIO 799 (15 credits)
5. Complete any language and/or research skill requirements.	-- One quantitative course (dissertation committee decides specific course; see Appendix B for list of courses)
6. Successfully pass your comprehensive exams.	4. Submit this form after successfully passing Written Comprehensive exam.
	5. Submit this form after successfully passing Oral Comprehensive exam.
7. Write your dissertation prospectus and have it approved by your committee	6. Submit this form after Research Prospectus is approved.
** Have a plan for satisfying the Professional Development requirement **	7. Teach a minimum of one laboratory section for at least one semester
	8. Deliver guest lectures (2-4 total) as a unit in an established course *or* deliver workshop/educational activities to K-12 students or non-technical audience
	9. Submit this form after steps 7 and 8 are complete. **This satisfies the Professional Development requirement of the OGPS**
8. Submit your application for admission to candidacy, after you have completed steps 1-7	10. Apply for admission to candidacy.
	11. Present two papers at state, regional or national meetings; submit this form
	12. Review the literature and write up review as a) stand-alone paper; b) introductory chapter to dissertation; or c) the introduction sections of all dissertation chapters, if chapters are written as separate manuscripts. Submit this form following committee approval.

9. Apply for graduation	12. Apply for graduation (one semester before graduating)
10. Submit your dissertation electronically to the ETD Coordinator for format review.	13. Dissertation format check
	14. Dissertation in final form to committee at least two weeks before defense
11. Schedule the oral defense of your dissertation	15. Present dissertation seminar to department and public in conjunction with oral defense
	16. Successfully pass Oral Dissertation Defense exam
12. Complete Revisions 13. Submit the corrected final copy of your dissertation to ProQuest	17. Make dissertation revisions 18. Submit final dissertation copies to Grad College
14. Submit the Survey of Earned Doctorates (SED)	
15. Participate in commencement ceremonies (optional)	

CONTINUOUS ENROLLMENT POLICY and LEAVE OF ABSENCE POLICY for GRADUATE STUDENTS

Please see the policy here.
Graduate students in degree programs that require continuous registration may be granted a Leave of Absence for up to one academic year by the OGPS, upon the recommendation of the student's advisor and department graduate coordinator. A leave will be granted under conditions requiring the suspension of activities associated with the thesis/dissertation or coursework. A leave will be granted for extraordinary reasons only, such as health or medical problems or military duty. Normally, time-to-degree requirements are not suspended during a Leave of Absence. The right to use University facilities and/or faculty time is suspended during a Leave of Absence. No form of graduate assistant support will be provided during the Leave of Absence. If an extension of time to complete the degree is needed, it should be requested in a petition for extension of time through the OGPS.

International students (students attending NAU on an F-1 or J-1 visa) are generally not eligible for a leave of absence due to INS regulations. Contact the International Student Adviser for any exceptional circumstances.

Leave of Absence requests must be filed no later than the last day for adding classes during the semester in which the leave is to start, and cannot be granted retroactively. Students on an approved Leave of Absence may not be required to apply for readmission.

Students who are absent beyond the end of an approved Leave of Absence will be required to apply for readmission as a graduate student and to the appropriate academic department. A Leave of Absence may be extended beyond one year only under exceptional circumstances. Such an extension must be requested on the Leave of Absence form. The form requests:

- Student name, student ID number, local address and phone
- Statement of request for leave and justification by student.
- Semester leave begins and semester of student's return to program.
- Approval by advisor, department graduate coordinator and OGPS.

FINANCIAL AID

Although it is the goal of the Department to provide financial support for all students admitted into the graduate program, we recognize that certain students may have their own means of support, and that many worthwhile research projects do not have large resource requirements. When the above conditions can be demonstrated (as determined by the Graduate Program Committee and approved by the Department Chair), the student will be considered for admission into our graduate program on an equal basis with those who would receive institutional support.

Admission to the graduate program in biology without support does not imply that financial support will necessarily be provided in the future. Such students would be considered on an equal basis along with all new applicants.

The Graduate Program Committee evaluates applicants and makes recommendations for the various types of financial aid to the Department Chair, who then makes a formal Departmental recommendation to the Graduate Dean. The Graduate Dean certifies the official appointments.

The OGPS publishes a comprehensive Graduate Assistantship, Traineeship, and Fellowship Policy Handbook which provides more policy and procedural details than appear in this Handbook.

Teaching Assistantships

Teaching Assistantships may be available to graduate students in the Biology Graduate Program. These TAs include an out-of-state Tuition Scholarship, 100% payment of resident tuition (but not associated fees), plus health insurance. A minimum semester and cumulative grade point average of 3.0, Good Academic Standing, plus satisfactory progress toward your degree program are required for continued support.

Teaching assistants are expected to devote 20 hours per week to their appointment, including teaching, office hours, preparations, testing and grading, and set-up and take-down of laboratories, and should expect to have 12 contact hours of teaching per week. They must have an excellent command of spoken English and of the relevant subject matter. Teaching Assistants must enroll in BIO 795, Internship in College Teaching (1 credit hour), in their first semester of the assistantship. This credit may count toward the required total credit hours for the M.S. and Ph.D. degrees. Teaching assistants must carry a course load of 9-12 hours per semester to qualify as full-time students. All teaching assistants must attend the University Graduate Assistant Orientation each Fall prior to the start of classes.

Guidelines are provided to Teaching Assistants every Fall concerning the policies and expectations as determined by the Department and the OGPS. See the Graduate Assistantship, Traineeship, and Fellowship Policy Handbook.

Teaching Assistants play a substantial role in the training of undergraduates, and this responsibility is not to be viewed lightly by the Teaching Assistant. For this reason:

- Teaching Assistants are expected to be in residence and available for assignment throughout the dates specified in their contract, beginning with the first and continuing through the last day of their contract. The contract period normally begins with the full week prior to the start of Fall classes, and includes several mandatory orientation sessions, TA training and other activities.

- The OGPS provides a mandatory orientation each Fall for the purpose of familiarizing the Teaching Assistants with the goals of the University and the Assistant's role in achieving these goals.
- Course coordinators will hold regular meetings with their Assistants. These meetings deal with organizational details, various aspects of good teaching techniques and course content, including the preparation and grading of assignments and examinations. Attendance at these meetings is mandatory.
- Course coordinators will evaluate all Teaching Assistants through no less than two classroom visitations. A standardized evaluation form, Bio Form 12, Faculty Evaluation of Graduate Assistants Form (available in the Biology Office) is used to report the results of these evaluations. Each semester an evaluation will be placed in the Teaching Assistant's individual file, and a copy given to the Teaching Assistant.

Research Assistantships

A variable number of research assistantships are available from research funds granted to the university and under the direction of individual faculty members. Recommendations for these appointments are made by the faculty members who administer these funds. Inquiries about availability should be made to the faculty doing research in the area in which the student is interested. These RAs include an out-of-state Tuition Scholarship and an in-state tuition waiver, plus health insurance. These appointments have a commitment of 20 hours per week during the academic year. The distribution of effort within these 20 hours is determined by the faculty member awarded the grant. A course load of 9-12 credit hours per semester is required for full-time status. A minimum semester and cumulative grade point average of 3.0, plus satisfactory progress in your degree program are required for continued support. See the Graduate Assistantship, Traineeship, and Fellowship Policy Handbook.

Fellowships

The availability of Fellowships varies from year to year. As the department is notified of these, they will be announced via e-mail. The Associate Chair for Graduate Studies, the Office of the Vice President for Research, and the Graduate Dean are also starting points for general information on Fellowships. Please also see the Graduate Assistantship, Traineeship, and Fellowship Policy Handbook.

Tuition Waiver

Several in-state and out-of-state Tuition Scholarships are provided to the department each year by the OGPS. These waivers are awarded to students by the Department Chair in consultation with the Associate Chair for Graduate Studies. Decisions are based upon the relative financial need and academic performance of the students.

Duration of Support

Graduate students in a master's program may receive two full academic years (four semesters) of support, regardless of its source, as long as they are making satisfactory progress toward completion of their degree requirements. Satisfactory progress is evaluated by the student's Graduate Advisory Committee and the Graduate Program Committee. In unusual cases the OGPS Dean may allow an extension. For such an extension, the student must be in good standing and be prepared to explain why a delay in the completion of the degree is due to circumstances beyond the control of the student. The student petitions the Department before the Department allocates its assistantships. The department forwards the petition to the OGPS with its recommendation.

A graduate student who has completed a Master's degree with two years of support and is then admitted into the Ph.D. degree program may receive additional years of support.

Although there is no firm limit on total years of support for a student in a doctoral program, up to four years is typical. The department carefully considers each student's progress before recommending an extension of support beyond four academic years in the doctoral program.

Regardless of where the student is in her/his program, only students who perform their duties well and make good progress in their program will be considered for continued support after their first year in a program. Relevant policies of the OGPS are provided in the Graduate Assistant Handbook.

EVALUATION OF TAs AND RAs

Teaching Assistants are evaluated each semester by course coordinators or faculty involved in the course. A standardized form for evaluation, Evaluation of Teaching Assistants, is available here. This form is submitted to the Director of Graduate Studies and the student's advisor, and is placed in the student's file.

Research Assistants are evaluated by their research supervisor, typically their Faculty Advisor. A summary of the student's progress and the Major Advisor's assessment of such progress is provided to the Biology Graduate Program each year using a spreadsheet indicating whether progress is excellent, satisfactory or unsatisfactory. Unsatisfactory ratings must be substantiated by the faculty mentor.

STUDENT'S ROLE IN THE DEPARTMENT

The Department provides students with professional training for professional life in teaching, research, and service. Students acquire these skills through interactions with faculty in formal courses, seminars (BIO 698), completion of thesis and dissertation research, publishing in the best possible scientific journals, service on faculty committees, attendance at departmental seminars, attendance and presentation of papers at scientific meetings, and interactions with visiting scientists. Evaluation concerning a student's leadership qualities and professional capabilities will often rely on the student's participation in these diverse activities. Such qualities may be reflected in letters of recommendation composed for students.

The Chair and the Faculty of the Department value the contributions that graduate students make toward the operation of the Department. The graduate student performs an important role in the Department by providing suggestions concerning all phases of departmental operations. A professional relationship between faculty and graduate students is encouraged at all times. Students may also contribute by inviting visiting scholars and helping to entertain them during discussions, at mealtimes and in receptions.

Students carry significant responsibilities in Departmental teaching, research, service and mentoring undergraduates. Some are employees of the Department, University, and State, and all are representatives of the Department on campus, at other institutions, and at professional meetings. Therefore, graduate students are expected to exhibit high professional standards, to be knowledgeable about departmental affairs, faculty and student activities, and in general to conduct themselves in a professional manner. Implicit in admission to the Graduate Program is the expectation that graduate students will develop and demonstrate a strong sense of professionalism and academic integrity. The faculty-graduate student relationship is unique in the academic environment and it must not be compromised by unprofessional conduct.

Success in science requires tremendous dedication to research. The competition for jobs is extreme and is based largely on the quality of independent research and the dedication perceived by those professors most closely associated with a graduate student.

A graduate student's research sponsor also has responsibilities to the University and often to a funding agency. University time and grant funds are expected to lead to the steady accumulation of relevant and reproducible data. Graduate student research is often, therefore, both an essential part of the student's education as well as part of the research sponsor's and the University's obligation to the larger scientific community.

Biology Graduate Student Association

The BGSA is formally recognized by the Associated Students of Northern Arizona University (ASNAU), the University administration, the Department Chair, and the Department Faculty as an official body through which graduate students in the Department may express opinions and convey suggestions to the Faculty. The President or other elected official of BGSA will approach the Associate Chair for Graduate Studies with student concerns, and work to effect positive change through consultation with the Department Chair, the Faculty, and the Graduate Dean, if so suggested by the Associate Chair for Graduate Studies. If BGSA's elected representative is so advised by the Department Chair, concerns will be presented to the faculty at faculty meetings. A BGSA representative will be permitted to attend all Faculty meetings except at the discretion of the Department Chair when unsuitable topics such as personnel matters are to be discussed. All students are encouraged to attend general meetings of the BGSA because issues affecting graduate students are discussed and votes taken on these issues. A BGSA representative will be elected to serve on certain departmental committees. One student may be elected to any committee the Faculty deems appropriate. Faculty Chairs on these committees will notify the BGSA representative concerning meeting times, dates, and the agenda for the meetings.

Graduate Student Awards

There are a number of scholarships and awards for graduate students, the availability of which can change year to year depending on donors. A centralized list of awards available across all departments in CEFNS can be found here.

EXPECTATIONS AND RESPONSIBILITIES OF TEACHING ASSISTANTS AND FACULTY IN THE DEPARTMENT OF BIOLOGICAL SCIENCES

Teachers in general have long adhered to a sound and honorable set of ethical standards and these traditional standards continue to apply in today's world. In an effort to circumvent any misconceptions or misunderstandings about what is expected of us, it is appropriate to state formally these basic principles that have been informally incorporated in the academic way of life for so long.

Above all, a single factor binds us together: we are professional biologists. This fact transcends individual differences in interests, expertise, degrees, or experience, and forms the basis for expectations and responsibilities related to our respective positions in the Department.

As professionals, we have a special obligation to encourage the free pursuit of learning in students, to preserve intellectual freedom, to practice intellectual honesty, to respect the rights, the dignity and cultural backgrounds of others, to acknowledge the right of all to express differing opinions in a responsible manner, to promote conditions that foster the free exchange of ideas, and to maintain the orderly processes that make freedom of inquiry and instruction possible.

As teachers, we represent the University, the Department and the profession. As such we must hold before students, as best we can, the scholarly standards of our discipline. We must make every reasonable effort to foster honest academic conduct and to assure that our evaluation of students reflects the students' true merit. We must recognize that students are individuals and are entitled to an atmosphere conducive to learning and to fair treatment in all respects of the teacher-student relationship. It is important to present a professional image in the classroom and in other interactions with students and colleagues. This includes proper attire, personal cleanliness, and basic common courtesies. In all contact with students we should use socially acceptable behavior and language. Under no circumstance should teachers participate in activities that might be construed as a conflict of interest such as dating or engaging in amorous relationships with a student enrolled in their lecture or laboratory course, or who is under their supervision. By adhering to the above standards of professional conduct we will be in a sound position to carry out our responsibilities for the health and well-being of the Department.

GRIEVANCE PROCEDURES

Students with significant complaints about any aspect of their training in the department should follow the grievance procedure documented for Graduate Assistants in the OGPS Graduate Assistant Handbook here.

Grade appeals are handled by policies and procedures found here.

POLICY AND FUNDING CHANGES

Changes relating to student support or policies beyond the control of the Department and University can occur. Under these circumstances the Department cannot be held legally responsible for any difficulties a student incurs.

Northern Arizona University does not discriminate on the basis of age, sex, race, religion, color, national origin, disability or veteran status in admissions, employment, and educational programs or activities which it operates as required by Title IX of the Education Amendments of 1972, Title VI and Title VII of the Civil Rights Act of 1964 as amended; Section 504 of the Rehabilitation Act of 1973 as amended; the Civil Rights Act of 1991; the Americans with Disabilities Act of 1990; and the Age Discrimination in Employment Act of 1967. NAU's policy on nondiscrimination is further augmented by the voluntary affirmative action policies of Executive Order 11246, Section 503 of the Rehabilitation Act of 1973, and the Vietnam Era Veteran's Readjustment Assistance Act of 1973 as amended. You may inquire about the application of these regulations or the NAU Safe Working and Learning Environment Policy by visiting the Office of Equity and Access.

APPENDIX A

List of Graduate Program Forms and Sources

The forms listed below are specific to the Biology department and can be found on the website here.

Report on Results of Written Comprehensive Evaluation
Report on Results of Oral Comprehensive Evaluation
Approval Form for Ph.D. Dissertation Prospectus
Evaluation of Teaching Assistants
Documentation of Teaching Experience for Ph.D. Students
Documentation of Paper Presentations for Ph.D. Students
Approval Form for Literature Review for Ph.D. Students

The forms listed below are specific to the OGPS:

Programs of Study
Checklists for Master's and Doctoral Students
Petition for Transfer Credit
Requirements for Theses and Dissertations
Electronic Thesis and Dissertation (ETD) Information
Application for Doctoral Candidacy
Dissertation Defense Scheduling Form
Instructions for Applying for Graduation
Petition for Extension of Time
Leave of Absence

APPENDIX B

Descriptions of Data Analysis, Statistics and Modeling Graduate Courses at NAU

Biology - BIO 523 - Meta-Analysis in Ecology and Evolution
This is an introductory course to meta-analysis. The course is designed for advanced graduate students who have an interest in ecological and evolutionary phenomena for which published data already exists. We will study the basic steps in meta-analysis design and implementation, including statistical models and the interpretation and presentation of results. Letter grade only.

Biology - BIO 599 - Introduction to Python
As datasets continue to increase in complexity, computational analysis is becoming a routine part of scientific research. This is a hands-on training course that shows you how to use general computing tools to work more efficiently and effectively in the biological sciences. This course will cover a broad range of powerful and flexible tools including text file manipulation with regular expressions, interacting with a command line interface, basic shell scripting, programming in Python and R, interaction with remote devices, and basic graphical concepts.

Forestry - FOR 606 - Applied Ecological Data Analysis Introduction and application of emerging and trending analysis techniques used to address ecological data problems. The course takes a modular structure, focusing in depth on a few such methods which may include resampling methods, structural equation modeling, ordination, nonparametric or spatial statistics, likelihood, etc. There are no hard pre-requisites, but prior undergraduate or graduate statistics or analysis courses are advised. Letter grade only.

Informatics and Computing - INF 504 - Data Mining and Machine Learning
Study of machine learning principles with a focus on uncertainty modeling, Bayesian inference, graphical models for complex inference problems, computational inference including message passing and Markov Chain Monte Carlo, and open research questions. Letter grade only.

Informatics and Computing - INF 511 - Modern Regression I
Matrix-based coverage of linear statistical models for independent data from frequentist and Bayesian perspectives, including regression, analysis of variance (ANOVA), estimation, testing, selection, diagnostics, and associated random variables and probability distributions. Letter grade only.

Informatics and Computing - INF 512 - Modern Regression II
Matrix-based coverage of linear statistical models for dependent data. Non-linear models for independent and dependent data. Includes estimation, testing and diagnostics within the context of generalized linear models, non-linear models, linear mixed models, generalize linear mixed models, non-linear mixed models. Letter grade only.

Informatics and Computing - INF 626/626L - Applied Bayesian Modeling (plus lab)
Bayesian statistical methods for analyzing data, with emphasis on ecological and biological data. Includes Bayes rule, basic Bayesian formulation (priors, posteriors, likelihoods), single- and multiple-parameter models, hierarchical models, generalized linear models, multivariate models, mixture models, models for missing data, merging statistical and process models, overview of spatial and temporal processes, and introduction to computation methods. Letter grade only.

626L: Laboratory section that accompanies INF 626. Guided, hands-on experience implementing Bayesian statistical models in JAGS and/or OpenBUGS via R. Emphasizes model building, writing code in JAGS or OpenBUGS, and writing code in R to run prepare data for the JAGS/OpenBUGS models, run the models, and evaluate model output. Letter grade only.

Statistics - STA 570/571 - Statistical Methods I and II
I: Sampling, t-tests, linear regression and correlation, elementary analysis of variance. Letter grade only. Course fee required. Prerequisite: undergraduate statistics course.
II: Analysis of variance and covariance, multiple and partial regression, nonparametric methods. Letter grade only. Course fee required.

Statistics - STA 572 - Multivariate Statistical Methods
Analysis of multivariate data: multivariate analysis of variance, discriminant analysis, canonical correlation, principal components, factor analysis, and cluster analysis. Letter grade only.

Statistics - STA 574 - Categorical Data Analysis Categorical data; two-way contingency tables; three-way tables; generalized linear models; logistic regression; log linear models; multiplicative models. Letter grade only.

Statistics - STA 676 - Experimental Design Analysis of variance and covariance, crossed and nested designs, multiple comparisons, randomized blocks, Latin squares, split plot designs, fractional designs. Letter grade only.

Health Sciences - HS 503 - Principles of Biostatistics.
This core graduate course in the public health curriculum covers principles of biostatistics in the context of public health applications. It will include the basic and advanced statistical techniques for analyzing and investigating public health issues. A statistical package will be used. Letter grade only.

Psychology - PSY 625 - Intermediate Statistics
Advanced descriptive and inferential statistics including parametric and nonparametric procedures. Undergraduate course in statistics required before taking PSY 625. Letter grade only.

Psychology - PSY 725 - Multivariate Statistics
Application of multivariate techniques to research. Undergraduate course in statistics required before taking PSY 725. Letter grade only

Educational Psychology - EPS 525 - Introduction to Statistics Descriptive and inferential statistics including central tendency, dispersion, correlation, regression, t-tests, analysis of variance, and non-parametric procedures. Letter grade only.

Educational Psychology - EPS 625 - Intermediate Statistics Advanced descriptive and inferential statistics including parametric and nonparametric procedures. Letter grade only.

Criminology & Criminal Justice - CCJ 614 - Research Statistics Quantitative research methodology techniques for survey data management and analysis. Emphasizes linear multivariate statistical techniques. Cross-listed with SOC 655. Letter grade only.