Graduate Student Handbook

Bioengineering Ph.D. Program
Northern Arizona University

Bioengineering Ph.D. Program,
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INTRODUCTION

Welcome to NAU and the Bioengineering Ph.D. Program. We recognize the challenges associated with relocating to a new place, institution, and program, and hope that this handbook will ease both the process of relocation and serve as a valuable source of information throughout your stay. This edition of the Handbook incorporates the most recent policy revisions by the Program faculty and University Graduate Committee.

At present the Bioengineering Ph.D. Program includes 25 faculty members from 8 different departments or centers including the Center for Bioengineering Innovation (CBI), Biological Sciences, Informatics & Computing, Mechanical Engineering, Physical Therapy, Physics, Civil & Environmental Engineering, and Communications Sciences. All segments of the Program share a long history of teamwork on both professional and social levels; all contribute significantly to the Program's functions and well-being.

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

Many sources of information about Flagstaff, NAU and the Program are available to you. The Chamber of Commerce is a short walk from campus and provides numerous brochures about life in and around Flagstaff. General information and regulations concerning graduate study at NAU, as well as courses offered by the Program, are described in the online "Academic Catalog" found at http://catalog.nau.edu and at the Graduate College website http://nau.edu/gradcol. The NAU Academic Catalog also contains a wealth of information about the University and the services it provides.

On a more local scale, faculty and graduate students can assist you in all matters concerning your full integration into the Program. You need to become thoroughly familiar with this Graduate Student Handbook and the on-line NAU Academic Catalog: http://catalog.nau.edu/. In conjunction with the NAU Catalog, this Handbook provides a concise and detailed statement of current regulations and guidelines you must follow during your graduate career at NAU. The Handbook will accurately describe most information relevant to you, but changes may occur prior to your arrival or during your studies in the Program.

Subsequent alterations in policy or process may supersede previous procedures, subject to the approval of your advisory committee.

We must emphasize that adherence to the regulations, guidelines, policies, and degree requirements described in the NAU Academic Catalog, on the Graduate College website, and in this publication, is the responsibility of the student and not the sole responsibility of the Faculty Advisor.

TO WHOM THE HANDBOOK APPLIES

The contents of this handbook are applicable to all students entering the Program in the Fall semester, 2016 and thereafter. Students who entered before this date should use the recommendations and requirements herein as far as is possible, but have the option of continuing under the requirements in effect at the time they were admitted to their current program.

ADMISSION TO BIOENGINEERING GRADUATE PROGRAMS

The Program is an interdisciplinary Doctor of Philosophy program. The Doctor of Philosophy program provides advanced training in research through focused coursework and extensive research experience. Other sections of this Handbook describe this program and its associated requirements in detail.

Entry into the Bioengineering graduate program requires on-line application to the Graduate College and review by both the Graduate College and the Bioengineering Ph.D. Program faculty.

General requirements for admission to the Graduate College are given in the NAU Catalog (on-line) as well as at the Graduate College's website http://nau.edu/GradCol/Admissions/ . A completed application to the Bioengineering Graduate Program consists of: completion of the Graduate College's on-line application form; satisfactory course grades; three letters of recommendation addressing qualifications for advanced studies; a Personal Statement of the student's interests, professional goals, and research and teaching experience; and scores on the general Graduate Record Examination. Advanced subject GRE scores are not required, but if provided, will be considered as part of an application. GRE scores must come to NAU directly from E.T.S. Self-reported scores are not accepted. **Most importantly, admission will be competitive and will also depend upon the availability of a Faculty Advisor.** Funding for the student, adequate space, research resources and equipment will also a factor in admission decisions.

Because of the limitations on admissions and the necessity for a faculty member to support acceptance, a meeting with potential faculty advisors prior to admission is strongly recommended. Prospective students should contact faculty directly by e-mail and or phone, and are encouraged to also set up a visit to campus (http://nau.edu/GradCol/Admissions/). Applicants should be prepared to discuss their backgrounds, specific areas of interest, and career goals.

Graduate degrees are awarded to students holding "regular admission" status. This status is conferred when a student has fulfilled all requirements for admission to both the Graduate College and to the Program, and has been recommended by the Program for admission to the Graduate College. Any "conditional admission" criteria must be satisfied to graduate or, in some cases, continue in the program.

Graduate credit may be earned by students holding conditional admission status or non-degree seeking status. Conditional admission status may be assigned to a student who, for some reason, is not qualified for regular admission status. The reasons for a student's conditional admission recommendation by the Program include, but are not limited to: lack of prerequisites for the program, lack of filing all necessary transcripts, a low cumulative undergraduate GPA (i.e., less

than 3.0), or some other deficiency. Non-degree seeking status may be granted by the Graduate College to students who do not intend to pursue a degree program or who are not yet ready to apply to a degree program. No more than 12 credit hours of graduate credit earned while the student is non-degree seeking may be applied toward any graduate degree, once admitted to that program. Please note that students who have completed hours while a non-degree seeking student and who have fully completed application procedures for regular admission are not assured admission to the Bioengineering program. They must be evaluated for admission along with all other applicants.

GRADUATE PROGRAM COMMITTEE (GPC) OF THE DEPARTMENT

Oversight of graduate studies in the Bioengineering Program resides with the Graduate Program Committee (GPC). The GPC is chaired by the Co-Directors of the Bioengineering Program. GPC membership includes appointed, voting faculty members of the faculty responsible for graduate courses in Bioengineering and an optional graduate student member with voting rights (including admissions decisions) who is recommended by the existing Bioengineering Graduate Study Body and approved by the GPC Co-Directors. The GPC membership may also include a Postdoctoral Fellow with voting rights (including admissions decisions) who is recommended by postdoctoral fellows of the faculty responsible for graduate courses in Bioengineering and approved by the GPC Co-Directors. 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 Co-Directors, ratification by the faculty, and final approval by the Dean of the Graduate College and/or the University Graduate Committee (where applicable). The Co-Directors are 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 and recommends candidates for different types of financial support to the Co-Directors (such as Graduate Teaching Assistantships, Graduate Research Assistantships, and Fellowships). Applications for admissions are normally reviewed early in the Spring Semester (**application deadline is January 15th**) of each academic year for admission the following Fall. Sometimes, though not typically, applications may be considered for Spring admission if submitted by **October 15th**, with the permission of the Co-Directors of the Bioengineering Graduate Program. Applicants for Spring admission will be directly compared to those in the Fall semester to insure they meet the same admission standards.

Recommendations for admission and financial support are made to the Co-Directors for final action. Co-Directors recommend candidates for admission and coordinate financial awards to admitted candidates with the Graduate College.

GETTING STARTED

Here are a few initial items requiring students' attention upon arrival. These, and more, will be covered at fall orientation programs of the Graduate College and Bioengineering Program.

- **Graduate Assistantships (RA, TA) and Fellowships**: Many graduate students in the Bioengineering program are offered some type of financial aid as part of their admission. Common

sources of financial support aid are: Graduate TA, Graduate RA, and Fellowships. All are competitive, and all pay a living stipend, provide tuition waivers, and provide health insurance coverage. If you have been selected for support as a GTA, GRA or Fellowship recipient, please read the following policy handbook to understand your rights and responsibilities: http://www2.nau.edu/gradcol/GA/GA_Handbook.pdf

- **FERPA training: GTA must be trained on appropriately handling student information** - https://nau.edu/registrar/ferpa/info/
- **University ID card:** After registering for classes, your photo ID can be obtained by filling out the online form at: http://home.nau.edu/jackscard/
- **E-mail:** The Program staff and faculty use official NAU e-mail for distribution of much information. Students are required to use their NAU e-mail for any official communication and to be kept informed of all issues, topics, meetings, funding opportunities, deadlines, workshops, related to your graduate student functions in the Program and University. An NAU e-mail user ID will be created for you upon matriculation. To set up your e-mail password, go to www.nau.edu/password or call the Academic Help Desk at 928-523-9294 if you need assistance.
- **Mailbox:** Graduate students in residence will have a mailbox available to them in their home department mailroom.
- **Keys:** Biology building keys are handled by Lois Neff (Lois.Neff@nau.edu). Engineering building keys are handled by Sarah Hunter (Sarah.Hunter@nau.edu). Science Lab Building and Wettaw Keys are handled by Bruce Bryant (Bruce.Bryant@nau.edu).
- **Office space:** Consult with your Faculty Advisor regarding desk space and the phone in her/his research area. Teaching Assistants are prioritized for shared office space.
- **Photocopies:** See the Program office staff for current procedures.
- **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 http://nau.edu/Human-Resources/Forms-Index/. You should contact Ms. Judith Irons in the Biology Office or Juana Blum in the ME Department for help with this.
- **Parking:** Permits to park on campus are purchased at Parking Services in the Centennial Building (#91) or Online at http://nau.edu/parking-shuttle-services/.
- **Pay Day:** Alternate Fridays are pay days. Direct deposit is encouraged. Your pay statement is on-line through the Human Resources web site.
- **Residency Status:** If you wish to establish Arizona residency, contact the Graduate College for details and visit this page: https://nau.edu/registrar/student-resources/arizona-residency/
- 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, both in-state and out-of-state, regardless of your residency status.

FACULTY ADVISOR

Throughout your studies in the program you will work most closely with your Faculty Advisor ("major professor"). This relationship will be established by mutual agreement based on your shared research interests and available resources. Your Faculty Advisor was 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 either of the Co-Chairs of the Program. It is imperative that you work closely (and communicate often) with your Faculty Advisor to plan your program of study and to insure that requirements are met in a timely manner and in accordance with the policies of the Program and

University.

Each Faculty Advisor has individualized expectations or lab policies for a student's 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 Graduate Advisory Committee). This is very important and 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,
- Animal care and use regulations, the IACUC at NAU,
- Protection of human subjects and associated regulations, the IRB committee,
- Safety/required training for all manners of handling radioactive and/or hazardous materials,
- Data notebooks, 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, assistance with placement.

GRADUATE ADVISORY COMMITTEE COMPOSITION

The Graduate College's policies on minimal composition of Graduate Advisory Committees and/or Dissertation committees can be found here:
https://policy.nau.edu/policy/policy.aspx?num=100806

The Graduate Committee must be composed of at least 4 committee members, as required by the Graduate College. Each student committee must have at least one representative from Biology and one from Engineering. The home department of the Chair of the committee represents the student's home department. At least one committee member must be from outside the student's home department, but still part of the Bioengineering Program. If a student wishes to have a committee member from outside the Bioengineering Program, that must be approved by the chair. Check the PhD in Bioengineering website for updates on the faculty:
https://nau.edu/CEFNS/Interdisciplinary/PhD-in-Bioengineering/Welcome/

The Graduate Faculty in Bioengineering have adopted the following policy to help clarify who are faculty "inside" vs. "outside" the Bioengineering Program for the purposes of a Graduate Student Advisory Committee:
The majority of members of a Graduate Student Advisory Committee will be composed of faculty in the Bioengineering Program. Additionally, Faculty Emeriti of the Department are considered "inside" the department for the purposes of a Graduate Student Advisory Committee.

DOCTOR OF PHILOSOPHY DEGREE (Ph.D.)

POLICY STATEMENTS: The general NAU University Policy Statement for Ph.D.-seeking Graduate Students may be found here: https://policy.nau.edu/policy/policy.aspx?num=100805.

The Bioengineering Ph.D. requirements meet or exceed the baseline NAU Ph.D. requirements, so please read both University Policy and Bioengineering Policy requirements carefully.
You are responsible for meeting NAU, Graduate College, and Bioengineering Ph.D. requirements to earn your Ph.D.

Ph.D. Program – Direct or Expedited Entry: Typically, completion of a thesis-based Master's degree is a required criterion for admission to the Ph.D. program. Completion of a Master's degree before a doctoral program provides the student an opportunity to demonstrate their abilities for graduate studies and for the faculty advisor to evaluate the same. Some faculty members will expect their students to complete a thesis-based Master's degree; and some will expect a research experience equivalent to a Master's thesis before offering support for a student's entry to doctoral level studies. As stated below, a person may be considered for admission to the Ph.D. program under exceptional circumstances either at the time of admission or while in a master's degree program.
Please note the pivotal role of the faculty advisor as the initiator of a petition to the GPC.

New Applicants: At the request of a sponsoring faculty member, a new applicant for graduate studies can be considered by the Graduate Program Committee for a recommendation to the Graduate College for direct admission to the Ph.D. program without already having completed a thesis-based master's degree.

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 a recommendation to the Graduate College for admission to the doctoral program prior to completion and successful defense of a M.S. thesis.

Each petition will be reviewed and discussed by the GPC on the full range of its individual merits, rather than in a "check-list" fashion. Some examples of the types of benchmark criteria the GPC would seek or expect may include, but are not limited to:

- Demonstrated promise for independent research development, design, interpretation and presentation.
- Previous research experience as an undergraduate student or associated with post-baccalaureate work, with reference letters attesting to the applicant's abilities; and/or
- Research presentation(s) at regional, national or international conferences in the profession, with reference letters attesting to the applicant's abilities; and/or
- Co-authorship(s) of peer-reviewed publication(s), with reference letters attesting to the applicant's abilities.
- Demonstrated promise for success in graduate level course work in Bioengineering and supporting areas germane to the student's area(s) of study.
- Strong undergraduate grade point average in a life science or engineering degree program and supporting science courses; and/or
- Strong performance on the GRE such as a composite percentile score (verbal, quantitative and essay) of 70% or higher.

Faculty Advisor and Graduate Committee:
https://policy.nau.edu/policy/policy.aspx?num=100806

University Graduate Committee Statement on Dissertation Committees:
http://www2.nau.edu/gradcol/ThesesDiss/Thesis_Dissertation_Roadmap.pdf

Formal Appointment of Doctoral Committee: Once the student and Faculty Advisor have decided who should be on the Graduate Advisory 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 Graduate College Dean, the "Dissertation Committee Recommendation Form" available here:
http://nau.edu/GradCol/Student-Resources/Theses-and-Dissertations/

The recommendation will be reviewed by the Graduate Dean, 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 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.

Students should submit the necessary paperwork to form a complete committee by the start of their 3rd semester. Changes to the committee after the 3rd semester are acceptable, but must be discussed and approved by the current committee Chair.

First Committee Meeting: All students must ensure that advisory committee meetings are confirmed one month 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 form,** in consultation with the Faculty Advisor available here:
http://nau.edu/GradCol/Degrees-and-Programs/Programs-of-Study-Page/

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 members of the committee, and by one of the Co-Directors of the Bioengineering PhD Program. After the form has been signed by all responsible parties, the original should be submitted to the program for your program file. Please keep copies of this completed form for yourself, your advisor, and each committee member.

Before the student's research begins (within the first academic year or as determined by the Faculty Advisor), a Dissertation Prospectus (Research Plan) must be submitted to the advisory committee by the student.
Endorsement of the dissertation 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. **Approval Form for Ph.D. Dissertation Prospectus, "Prospectus Approval" form is available here:**
http://nau.edu/CEFNS/Interdisciplinary/PhD-in-Bioengineering/Handbook/

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. 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. This fall meeting would include preparation of the student's **Financial Request/Progress Report Form, "Financial Request" form found here:** http://nau.edu/CEFNS/Interdisciplinary/PhD-in-Bioengineering/Handbook/.

The Financial Request Form is essential before evaluation commences for continued financial support. **Students who neglect the timely completion of this annual responsibility might not be considered for continued financial support. After February 15th, a list of TA requests for continuing students is derived from completed Form 10s.**

The Progress Report includes the following information:

- A concise statement of the questions addressed, followed by a summary of the data and their analyses.
- A statement of how these data relate to the student's timetable in the Research Plan.
- A plan of experiments and observations for the next research period.
- Course work and other requirements completed. Evidence of adherence to the Ph.D. program schedule.\
- Professional activities such as papers prepared or published, attendance at professional meetings, oral papers/presentations presented, submission of grant proposals and funding acquired, reviewing of papers, committee memberships, etc.
- Plan of course work and other activities to build the necessary background.

In agreement with the Graduate Advisory Committee, the Faculty Advisor will provide a written statement for the student's departmental file and for the student concerning the adequacy of progress being made. The student is responsible for the initial preparation and ultimate filing of this report. It 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 and one semester in which to improve this status. If progress remains unsatisfactory, the student will be dismissed from the degree program and any future appointment with financial support. The student has recourse to normal departmental grievance procedures (See Section on Grievance Procedures).

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 bioengineering, a student's breadth of knowledge in the major principles of bioengineering 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 can be found in the Bioengineering Ph.D. Academic Requirements and Admissions: http://nau.edu/CEFNS/Interdisciplinary/PhD-in-Bioengineering/Program-Information-page/.

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 bioengineering sub-disciplines are found and to prepare students to teach introductory courses in their area(s) of study. The ultimate goal is to expand the bioengineering perspective of students so that they can conceptualize ideas with a broader base of knowledge and identify potential interdisciplinary research questions.

The Ph.D. in Bioengineering at NAU requires a minimum total of 60 credit hours beyond the bachelor's degree, as follows. Of the 60 hours, a minimum of 15 hours must be BIOEGR 799, BIO 799, or ME 799 (Dissertation). Additional hours of Bio 799 or ME 799 do not count toward the minimum credit hour total of 60. The remaining 45 credit hours must be approved by the Faculty Advisor, Graduate Advisory Committee and Associate Chair for Graduate Studies. A minimum of 37 credit hours must be at the 500-/600-level and no more than 2 classes may be at the 400-level. As approved by the Faculty Advisor, Graduate Advisory Committee and Assoc. Chair for Graduate Studies, graduate course credits completed for a master's degree may be applied toward the doctoral program. An approved program of study may include up to 12 combined credit hours of BIO 685 or ME 685 toward the degree requirements, as with the M.S. degree.

Courses in cognate fields such as, but not restricted to, engineering, chemistry, geology, mathematics & statistics, forestry, paleontology, computer programming, etc. may be included in the course plan. Statistics is required for analysis of data, so a minimum of Statistical Methods I and II (STA 570 and 571), or Quantitative Biology BIO 682 or equivalent is strongly recommended. The student's committee will decide whether or not to make these courses a requirement. It must be realized that when advice is needed on experimental design and/or statistical analysis, faculty in the Mathematics Department will expect, if not require, that the appropriate math courses be completed, or that current enrollment in the two-semester sequence of statistics in the Mathematics Department has been established. Additional courses in statistics are desirable, such as Multivariate Statistical Methods (STA 572) and Nonparametric Statistics (STA 472).

Seminar Requirement: The program of each doctoral student must include a minimum of three (3) topical Biology or Mechanical Engineering seminars (BIO/ME 698) that are open enrollment (that is 698 Biology seminars that have their topic listed in the LOUIE class schedule, and are open for any graduate student to take). These seminars must be taken after admission to the doctoral program.

One of these required topical seminars must cover Research Grant Proposal preparation, i.e., the Grant Writing Seminar. As part of this seminar the student will learn how to formulate a research proposal and prepare a research proposal as part of the class requirements. 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 other two seminars may be any other open enrollment topical seminars open to all students. Limited enrollment BIO 698 seminars intended for students in a certain professor's research lab group do not satisfy this requirement. Such limited enrollment seminars do, however, count toward the general 60 credits needed for graduation.

Graduate students are expected to attend all department seminars. 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.

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

- At least 15 credit hours of BIOEGR 799, or BIO 799, or ME 799, Dissertation.
- Forty-five (45) credit hours approved by the Faculty Advisor, Graduate Advisory Committee and Director of Graduate Studies. A minimum of 37 credits must be at the 500-/600-level and no more than 6 credits may be at the 400-level. An approved program of study may include up to 12 combined credit hours of Bio 685 and/or ME 698 toward the degree requirements.
- Three one-credit seminars (BIO/ME 698) must be taken. One seminar must be Grant Proposal Writing (BIO 698). Although no credit is given, attendance at all departmental seminars is required.
- Also note that a Ph.D. foreign language exam does not earn credit hours. (See Language Requirement section.)

Additional Graduate College and Program Requirements for the Ph.D.:
https://policy.nau.edu/policy/policy.aspx?num=100805
Students must demonstrate reading competence in one foreign language (in an exam administered by the Department of Modern Languages)—or in a research skill if approved for the program by the University Graduate Committee. Biology or Forestry may, in consultation with the graduate program committee, select either the foreign-language option or the research-skill option

- **Research Requirements:** The Ph.D. degree requires a demonstration of considerable independence, research skill, and experience in a discipline within bioengineering. 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 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.
- **Language Option**: Proficiency in translating and demonstrating reading competence in one foreign language is optional, but not required if the student chooses a research option.
- **Statistics Option:** The student and faculty advisor should work together to determine

any statistics or advanced math courses that should add to the individual program of study. No more than 6 hours (2 courses) should be 400 level offerings.

- If the student has had one undergraduate course, then a two-course sequence at or above the 400- level is required. The courses most likely to be required would be STA 570:571 Statistical Methods I and II or equivalent. Additional courses such as STA 471 Regression Analysis, STA 472 Nonparametric Statistics, STA 572 Multivariate Statistical Methods, or BIO 682 Quantitative Biology (when offered) may be recommended.
- If the student has had modest exposure to graduate statistics, for example one graduate course, the Graduate Program Committee will require an additional course such as STA 471, STA 472, STA 571, STA 572 or BIO 682.
- If the student has had extensive graduate training in statistics (e.g. at least two courses in statistics equivalent to STA 570:571), the Graduate Program Committee may agree that no further training is necessary and the student will have satisfied the requirement.

In any case, student and the Graduate Advisory Committee must agree on the courses to be taken during their first meeting, and be approved subsequently by the Director of Graduate Studies and the Chair of the Department.

Candidacy Requirements: Two components are required for candidacy advancement: 1) a Qualifying Exam and 2) a Dissertation/Research Prospectus.

1) **Qualifying Exam:** The Written and/or Oral Comprehensive evaluations are designed to assess the student's breadth and depth of knowledge in bioengineering, as well as their analytical ability, innovation, and critical reasoning skills. The requirements for the qualifying exam will be determined by the student's graduate committee. The qualifying exam will include an oral or written component, or a combination of both. The exam will evaluate breadth in the student's course of study, and depth in the student's area of expertise. Upon successful completion of the qualifying exam the students should be ready to proceed into the final, intensive, research phase of their degree program with the tools necessary to be successful in their professional activities.

    a) **Written Comprehensive Evaluation**
    This evaluation provides an opportunity for students to display their knowledge in bioengineering and in research skills. The student should be evaluated on understanding of the field and ability to bring together ideas and solve comprehensive problems. The written evaluation is constructed by all members of the student's Graduate Advisory Committee and lasts about 2-3 hours.

    b) **Oral Comprehensive Evaluation**
    This evaluation provides an opportunity for students to display their knowledge in bioengineering 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 2-3 hours.

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 and Written Comprehensive Evaluations and of the format to be followed. The following components may also

be included:

- 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 bioengineering, that are the focus of the student's research, and the history, conceptual development of, and recent developments in research-related fields.

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 or Written Comprehensive Evaluation, a student must obtain at least three-fourths of the votes in favor of passing. If the Oral or Written Comprehensive Evaluation is failed, it may be repeated only once within 1 Semester of the failed attempt. 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 will 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.
The form **Report of Results of Qualifying Exam, "Oral Comprehensive Exam Results" form, is available here:** http://nau.edu/CEFNS/Interdisciplinary/PhD-in-Bioengineering/Handbook/

The qualifying exam components must be passed to advance to Candidacy. A student who is making satisfactory progress toward the Ph.D. degree must have completed the qualifying exam by the end of his/her fifth semester. A student may retake the qualifying exam no more than once, and must be completed no more than one semester after the first attempt.

2) **Dissertation/Research Prospectus:** The Prospectus component will help develop (and reflect) the student's ability to research the primary scientific literature, critically review, and creatively express interpretations of the subject matter. In addition, the student will reinforce skills in formulating and presenting an independent research proposal.
    a) The Dissertation/Research Prospectus should be 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.

Requirement for Passing and Reporting Dissertation/Research Prospectus Results. To pass, a student must obtain at least three-fourths of the full Graduate Advisory Committee (including Faculty Advisor) in favor of passing. If the Research Prospectus is not passed, the student should convene her/his Graduate Advisory Committee to discuss the deficiencies and a plan for improvement.
The form **Report of Results of the Research Prospectus, "Written Comprehensive Exam Evaluation" form** (original or revised), is available on the program website here: http://nau.edu/CEFNS/Interdisciplinary/PhD-in-Bioengineering/Handbook/.

Teaching Requirements: All students completing the Ph.D. in the Bioengineering will have gained relevant teaching experience through a variety of options. Teaching requirements are based on home department needs, as determined by the student's committee. 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 an excellent performance. 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.

All Ph.D. students are encouraged to present scientific papers at the state, regional or national level.

The forms **Documentation of Teaching Experience for Ph.D. Students, "Teaching Experience Documentation" form,** and **"Paper Presentations Documentation" form are available here:** http://nau.edu/CEFNS/Interdisciplinary/PhD-in-Bioengineering/Handbook/

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.

The **Application for Candidacy for the Doctoral Degree** form is available on-line here: http://nau.edu/GradCol/Policies-and-Forms/Forms/ and the list the requirements for admission to candidacy. These include, but are not limited to:

- Confirmation of two consecutive semesters of full-time study in residence after admission to the Ph.D. program (see the Graduate Catalog Residency Requirements),
- Completion of the two components of Advancement to Candidacy "Written Comprehensive Exam Evaluation" and "Oral Comprehensive Exam Results" forms.
- Completion of all course work on the Program of Studies approved by the Faculty Advisor, Graduate Advisory Committee, the Associate Chair for Graduate Studies (plus, consideration and approval of any changes since the form was initially prepared). This includes removal of course deficiencies specified by your committee.
- Approval of a prospectus of the dissertation.
    - The **Approval form for Ph.D. Dissertation Prospectus, "Prospectus Approval" form**, is available here: http://nau.edu/CEFNS/Interdisciplinary/PhD-in-Bioengineering/Handbook/

At this point, 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.

Dissertation Requirements:
Dissertation formatting requirements and other valuable information are outlined here: http://nau.edu/GradCol/Student-Resources/Theses-and-Dissertations.
The official policy governing Thesis and Dissertation requirements can be found here: https://policy.nau.edu/policy/policy.aspx?num=100806.

The Electronic Thesis and Dissertation (ETD) Coordinator in the Graduate College is your source for current requirements regarding format, style, and deadlines, and the "format check."
Note: All Theses and Dissertations will be completed and submitted electronically through ProQuest (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 Graduate College and ProQuest. This "format check" is required and can prevent lengthy and costly delays.

Two types of Dissertation formats are acceptable. The preferred form in this program 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 Dissertations 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 undeniable 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 (minimum of 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, and a copy to the Graduate College, at least 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.

To avoid having to sign up for additional credit hours after the semester in which you defend, you must submit the final approved copies of your thesis or dissertation to the Graduate College by the last day of the semester in which you complete your defense. If you do not meet this deadline, you must register for 1 hour of dissertation (799) credit each semester after your defense until you submit your final, approved copies to the Graduate College. For more information, see the section titled Thesis and Dissertation Requirements in the Requirements for Graduate Degrees section of the Graduate Catalog and the following policy:
https://policy.nau.edu/policy/policy.aspx?num=100806

Financial responsibility for all aspects of dissertation preparation rests with the student.

Dissertation Defense Seminar: The Ph.D. degree requires that each student present a formal Dissertation Defense Seminar open to the public. 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.

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 Graduate College the deadline for holding a dissertation defense. No more than four years (8 semesters) shall elapse between the advancement to candidacy 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. Each student will take this examination and students are encouraged to schedule the examination immediately after the dissertation defense seminar. It is designed to test a student's competence in research, as well as adequacy of the dissertation, as 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 (minimum is 1.5 hours, maximum 3 hours).

The examination is scheduled by the student through the Graduate College a minimum of two weeks (10 working days) in advance. It is strongly encouraged the examination is scheduled well ahead of this deadline, as the Graduate College Dean assigns a University Graduate Committee member to the defense. The Defense Scheduling Form is available on the Graduate College website: http://nau.edu/GradCol/Policies-and-Forms/Forms. This Oral Defense Checklist and a "defense-ready" copy of the dissertation will be sent to the Graduate College Electronic Thesis and Dissertation Coordinator (etd@nau.edu) a minimum of two weeks (although earlier is ideal) before the defense date.

In preparation for this examination, the student must consider the following points (consult the Dissertation Defense Scheduling Form, from the Graduate College):

- A copy of the dissertation, in final form, must be distributed to all committee members, and to the Graduate College, at least two weeks (earlier is ideal) 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 defenses cannot occur in the last two weeks of the term. 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. (if relevant) 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 the audience. 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. These notes will become part of the student's permanent program file.

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 Graduate College. 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 Graduate Dean also appoints an observer from the University Graduate Committee to attend the defense seminar and 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 in person, through Skype, through conference call, or through group email exchange to evaluate the student once each year. In addition, the Registrar and Graduate College 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 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 3.00 ("B") or better. Students are expected to complete courses listed on their approved program plan before taking other courses. A Financial Request/Progress Report Form ("Financial Request" form) will be filed once per year by the student after the annual meeting with the Graduate Advisory Committee. This progress report must be on file before evaluation concerning continued funding can take place (February 15th). A copy will be placed in the student's permanent file.

Good Academic Standing and Academic Probation
For details on Good Academic Standing and Academic Standing please refer to the Graduate College policy:
https://policy.nau.edu/policy/policy.aspx?num=100319

Extension of Time
If you wish to petition for an extension of the time limit, you must request an extension on the appropriate form available here:
http://nau.edu/GradCol/Policies-and-Forms/Forms/
Your advisor and the department chair must support your petition by signing the form.

Application for Graduation: At the start of each academic year, the Graduate College announces its deadlines for filing the Application for Graduation:
http://nau.edu/GradCol/Deadlines/
You must apply for graduation at least one semester before your anticipated graduation term. The online application and instructions are available at the Graduate College website:
http://nau.edu/GradCol/Policies-and-Forms/Forms/.

CHECKLIST FOR Ph.D. STUDENTS IN BIOENGINEERING

The following checklist will aid your timely completion of program requirements.

Please also see the Graduate College's "Checklist for Doctoral Students" available here:
http://nau.edu/GradCol/Policies-and-Forms/Forms/

- Formalize your Graduate Advisory Committee membership; written request to the Chair of the Department, which is forwarded by Associate Chair for Graduate Studies, on your behalf, to the Graduate Dean.
- Formalize Doctoral Degree Program plan of study with Faculty Advisor, Graduate Advisory Committee and Director of Graduate Studies.
- Residency requirement - two consecutive semesters of full-time study after admission to the program.
- Seminar in Grant Proposal Writing, encouraged – discuss with committee
- Two one-credit seminars. Not including "research team" seminars, nor Grant Proposal Writing.
- In addition, 45 credits of course work beyond the bachelor's degree, excluding thesis or dissertation credit. No more than eight credits 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/ME 799).
- Foreign language or Statistics option.
- Research Prospectus form ("Written Comprehensive Exam Evaluation" form)
- Qualifying Exam form ("Oral Comprehensive Exam Results" form).
- Approved Dissertation Research Prospectus ("Prospectus Approval" form),
- Admission to Candidacy.
- Presentation of two papers at state, regional or national meetings ("Paper Presentations Documentation" form).
- Application for Graduation - should make application one semester before expected graduation.
- Dissertation format check completed by the Format Editor of the Graduate College.
- Dissertation in final form.
- Dissertation seminar presented to program & public in conjunction with the oral defense.
- Oral Dissertation Defense Examination.
- Dissertation revisions made.
- Final dissertation copies submitted to the Graduate College as described above

LEAVE OF ABSENCE POLICY FOR BIOENGINEERING GRADUATE STUDENTS

Graduate students in degree programs that require continuous registration may be granted a Leave of Absence for up to one academic year by the Graduate Dean, 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. Time-to-degree requirements are not suspended during a Leave of Absence. (If an extension of time to degree is needed, it should be requested in the request for 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.

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 to add a class during the semester in which the leave is to start, and cannot be granted retroactively. Students on an approved Leave of Absence will 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 will be extended beyond one year only under exceptional circumstances. Such an extension must be requested on the Leave of Absence form.

A Leave of Absence form is available on the Graduate College site here:
http://nau.edu/GradCol/Policies-and-Forms/Forms/

FINANCIAL AID

Although program attempts to provide financial support for all students admitted into the graduate program, it is recognized 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 bioengineering 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. Evaluation for continued financial support is a part of the yearly progress meetings and is based on previously established criteria outlined in pertinent sections above and on the **Financial Request/Progress Report Form, "Financial Request" form**. To be considered for continued support, the student must complete the Financial Request/Progress Report Form by February 15th.

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 recommendation to the Graduate Dean. The Graduate Dean certifies the official appointments.

The Graduate College publishes a comprehensive "Graduate Assistantship, Traineeship, and Fellowship Handbook," providing additional policy, procedures, expectations, and details, available here: http://nau.edu/GradCol/Policies-and-Forms/Policies/

Teaching Assistantships:
A number of teaching assistantships may be available to qualified graduate students in the program. These TAs include an out-of-state Tuition waiver, partial or full coverage of in-state tuition (depending on full- or part-time GA status), and health insurance. A minimum semester and cumulative grade point average of 3.0, plus satisfactory progress in your degree program are required for continued support.

Teaching assistants are expected to devote 20 hours per week to their appointment, including teaching (12 contact hours per week), office hours, preparations, testing and grading, and set-up and take-down of laboratories. 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 credit hours for the Ph.D. degrees. Teaching assistants must carry a course load of 9-12 hours per semester to qualify for their assistantship. All teaching assistants must attend the Graduate College and Graduate Assistant Orientation in the Fall prior the start of their degree program.
Please see: the "Graduate Assistantship, Traineeship, and Fellowship Handbook," available here: http://nau.edu/GradCol/Policies-and-Forms/Policies/

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 Graduate College provides a mandatory workshop 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, "Evaluation for Teaching Assistants and Faculty Associates" form, Faculty Evaluation of Graduate Assistants Form 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. A course load of 9-12 credit hours per semester is required to hold a research assistantship. A minimum semester and cumulative grade point average of 3.0, plus satisfactory progress in your degree program are required for continued support.

A commitment of 20 hours per week is required during the academic year. The distribution of effort within these 20 hours is determined by the faculty member awarded the grant. These RAs include an out-of-state Tuition Scholarship, partial coverage of in-state tuition plus health insurance. To maintain full-time status, a course load of 9-12 credit hours per semester is required. A minimum semester and cumulative grade point average of 3.0, plus satisfactory progress in your degree program are required for continued support.
Please see: the "Graduate Assistantship, Traineeship, and Fellowship Handbook," available here: http://nau.edu/GradCol/Policies-and-Forms/Policies/

Fellowships:
The availability of Fellowships (e.g. ARCS awards, PEO awards, IGERT fellowships, SFAz fellowships, etc.) varies from year to year. As the program 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 see: the "Graduate Assistantship, Traineeship, and Fellowship Handbook," available here: http://nau.edu/GradCol/Policies-and-Forms/Policies/

Tuition Scholarships:
Several in-state and out-of-state Tuition waivers are distributed to academic units from the Graduate College each year. These waivers are awarded by the program based on the recommendation of 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. Per Regents' policy, only Arizona Residents are eligible for an in-state tuition scholarship via this source.

Additionally, other scholarship opportunities are also available to graduate students on an annual basis. Those opportunities, criteria, and application instructions can be found here:
http://nau.edu/GradCol/Financing/Scholarships-Fellowships/

Students who will be applying for this type of support should also indicate this on the annual Financial Application/Progress Report Form ("Financial Request" form).

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 Graduate Dean may allow an extension. For such an extension, the student must be in good standing and any delay in the completion of the degree must be due to circumstances beyond the control of the student. The student petitions the program before the program allocates its

assistantships. The program forwards the petition to the Graduate College 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. There is no firm limit on total years of support for a student in a doctoral program, however, up to four years is typical. The program carefully considers each student's progress before recommending an extension of support beyond four academic years in the doctoral 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.

EVALUATION OF TAs, RAs, AND FACULTY ASSOCIATES

Teaching Assistants are evaluated each semester by course coordinators or other faculty involved in the course. A standardized form for evaluation, "Evaluation for Teaching Assistants and Faculty Associates" form, is available online http://nau.edu/CEFNS/Interdisciplinary/PhD-in-Bioengineering/Handbook/. These completed forms are submitted to the Director of Graduate Studies, and the student's advisor, and 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 included in the Financial Request/Progress Report Form, "Financial Request" form, which is completed each year before February 15th, and placed in the student's program file.

Program technicians are evaluated once each year by their immediate supervisor. A letter of evaluation from the student's supervisor is placed in the student's program file, and a copy given to the student, before February 15th of each year.

Faculty Associates are evaluated each semester. Evaluations by students are conducted according to the standardized procedures of the College. Faculty Associates are also evaluated by an appropriate regular faculty member, either the student's Faculty Advisor, or the faculty member directly responsible for a given course being taught by the Faculty Associate. This evaluation is in the form of a letter and is based upon at least two classroom visits per semester. The letter is placed in the student's program file, and a copy is given to the student and the Associate Chair for Graduate Studies.

STUDENT'S ROLE IN THE PROGRAM

The program 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 (BIOEGR 698 or BIO 698), completion of thesis and dissertation research, publishing in the best possible scientific journals, service on faculty committees, attendance at 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 value the contributions that graduate students make toward the operation of the program. The graduate student performs an important role in the program by providing suggestions concerning all phases of 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 teaching, research, service and mentoring undergraduates. Some are employees of the Program, University, and State, and all are representatives of the program on campus, at other institutions, and at professional meetings. Therefore, graduate students are expected to exhibit high professional standards, to be knowledgeable about program 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 a responsibility 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.

Student Groups:

Program candidates may want to form a student group. Such an organization could 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.

Graduate Student Awards:

As the program grows, awards specific to PhD in Bioengineering candidates may become available.

EXPECTATIONS AND RESPONSIBILITIES OF TEACHING ASSISTANTS, FACULTY ASSOCIATES, AND FACULTY IN THE BIOENGINEERING GRADUATE DEGREE

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 bioengineers. This fact transcends individual differences in interests, expertise, degrees, or experience, and forms the basis for expectations and responsibilities related to our position in the program.

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 program 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. E.g., under no circumstance should teachers participate in activities that might be construed as a conflict of interest such as dating 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 program.

GRIEVANCE PROCEDURES

Students must follow the official "Academic Appeal Policy and UGCHP – Graduate" policy outlining criteria, instructions, and procedures for any grievance not addressed by an existing university-wide appeal process:
https://policy.nau.edu/policy/policy.aspx?num=100103

Grade appeals, procedures, and criteria may be found in "Grade Appeals, All Students" policy located here: https://policy.nau.edu/policy/policy.aspx?num=100103

Academic Integrity violations are handled through the "Academic Integrity Policy" located here: https://policy.nau.edu/policy/policy.aspx?num=100601

POLICY AND FUNDING CHANGES

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

SAFE LEARNING AND WORKING ENVIRONMENT POLICY

NAU's Safe Learning and Working Environment policy is located on the Department of Equity and Access's website: http://nau.edu/Diversity-NAU/_Forms/Safe-Working-and-Learning-

Environment-Policy/

FACULTY AND STAFF OF THE GRADUATE DEGREE IN BIOENGINEERING

The faculty and staff page is located here: http://nau.edu/CEFNS/Interdisciplinary/PhD-in-Bioengineering/Welcome/.

APPENDIX A
List of Graduate Program Forms and Sources

The forms listed below are available on the website:
http://nau.edu/CEFNS/Interdisciplinary/PhD-in-Bioengineering/Handbook/

- "Written Comprehensive Exam Evaluation": Report on Results of Written Comprehensive Evaluation
- "Oral Comprehensive Exam Results": Report on Results of Oral Comprehensive Evaluation
- "Prospectus Approval": Approval Form for Ph.D. Dissertation Prospectus
- "Financial Request Form": Financial Request/Progress Report Form
- "Evaluation for Teaching Assistants and Faculty Associates"
- "Teaching Experience Documentation": Documentation of Teaching Experience for Ph.D. Students
- "Paper Presentation Documentation": Documentation of Paper Presentations for Ph.D. Students

The forms listed below may be obtained from the Graduate College website:

- Application for Graduate Admission: http://nau.edu/GradCol/Admissions/Application/
- Ph.D. Program of Study Form: http://nau.edu/GradCol/Degrees-and-Programs/Programs-of-Study-Page/
- Petition for Transfer Credit: http://nau.edu/GradCol/Policies-and-Forms/Forms/
- Checklist for Doctoral Students. http://nau.edu/GradCol/Policies-and-Forms/Forms/
- Master's Thesis and Doctoral Dissertation guidelines: http://nau.edu/GradCol/Student-Resources/Theses-and-Dissertations/
- Application for Candidacy for the Doctoral Degree (multiple attachments with this) http://nau.edu/GradCol/Student-Resources/Theses-and-Dissertations/
- Dissertation Defense Scheduling Form Checklist http://nau.edu/GradCol/Student-Resources/Theses-and-Dissertations/
- Application for Graduation (multiple attachments to include) http://nau.edu/GradCol/Student-Resources/Graduation/
- Petition for Extension of Time Limit (six years for master's candidates, including time in non-degree status) http://nau.edu/GradCol/Policies-and-Forms/Forms/
- Leave of Absence http://nau.edu/GradCol/Policies-and-Forms/Forms/