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INTRODUCTION

Objective of the Handbook

The objective of this document is to summarize for applicants, new entering graduate students and continuing graduate students the current academic requirements for the Doctor of Philosophy degree in Bioengineering. The handbook serves as a guide for doctoral study by outlining for the student important deadlines, degree requirements and rules and regulations imposed by the Department, the College of Engineering and Applied Sciences, and the Division of Graduate Studies (DGS). It also outlines the standards of performance expected of all doctoral degree candidates. In some cases inconsistencies arise between the contents of the handbook and the DGS as policies are changed by the DGS and the College of Engineering. In these cases, the University's published rules and policies take precedence. Inconsistencies are eliminated in future revisions of the handbook. Please report any inconsistencies to the chair of the department's graduate committee.

Students can use the departmental forms included in the back of this handbook. DGS forms are, however, samples and should be obtained at the DGS, Wilson Hall (Room 101), for the most current version.

Graduate Student Responsibilities

It is the responsibility of the graduate student to know and to observe all procedures and requirements as defined in this handbook, the Graduate Catalog, the Schedule of Classes, and the Guide to the Preparation of Master's Thesis or Doctoral Dissertation. Students may obtain a copy of the Graduate Catalog from the ASU bookstore. A copy of the Schedule of Classes is obtained from any registration site. The Guide to Preparation of the Master's Thesis or Doctoral Dissertation is obtained from the DGS. Graduate students are expected to be familiar with the Code of Conduct, which is available in the Office of Student Affairs. Violations of the Code of Conduct or incidents of dishonesty such as cheating in examinations, cheating in laboratory work or plagiarism is subject to university discipline whether committed by individuals or groups. Graduate students are expected to maintain the highest degree of academic integrity, enthusiasm for their academic studies, and a high degree of intellectual curiosity. For more information please refer to the following website: http://www.eas.asu.edu/fulton/departments/acad_affairs/integrity.php

Faculty Responsibilities

Faculty members accepting the responsibility of mentoring graduate students are expected to know and to observe the procedures and requirements defined in this handbook and the other publications listed above.

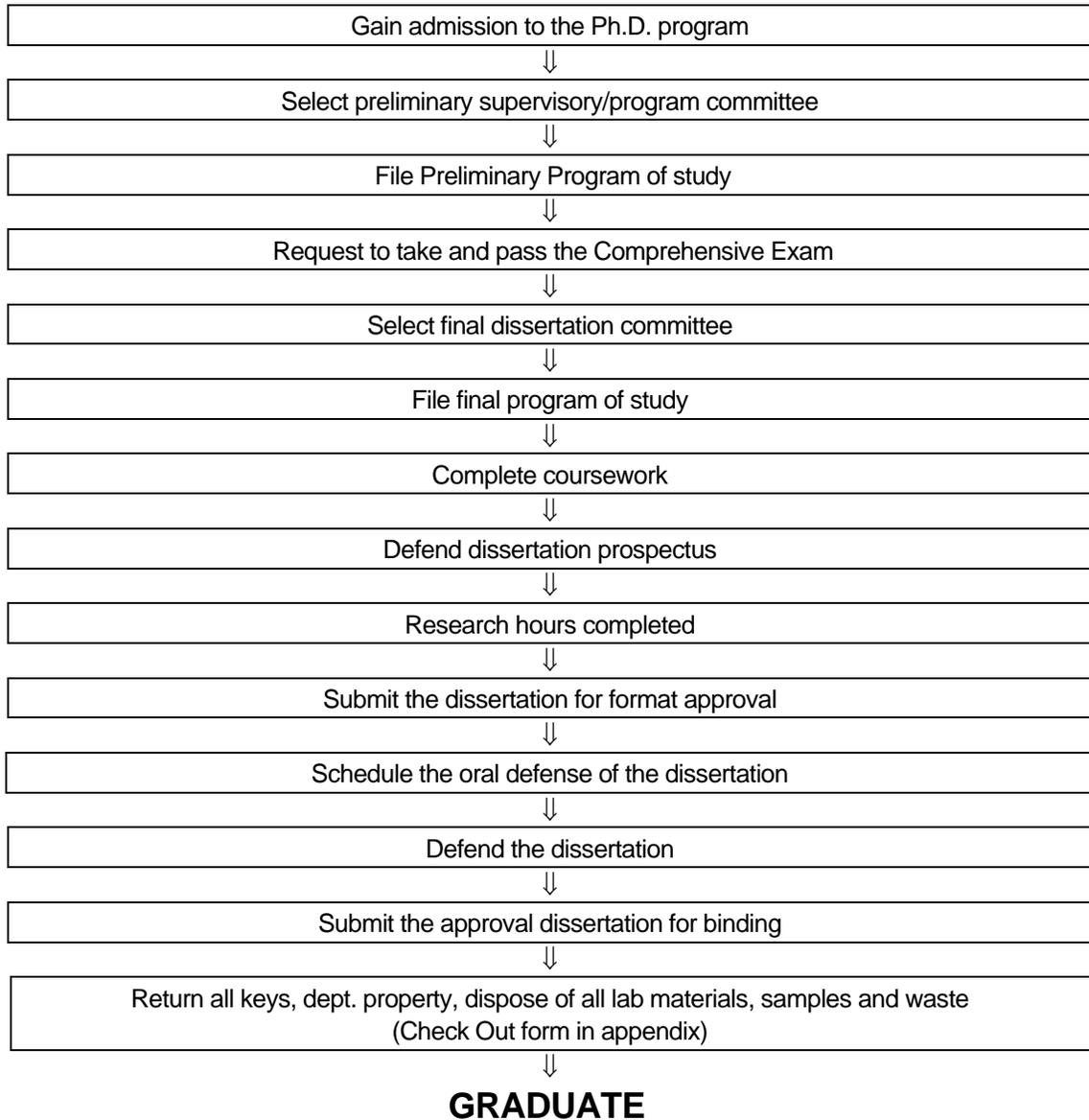
Safety

The department is committed to providing a safe work environment for faculty, staff and students. Students are required to follow safe procedures in accomplishing their research and teaching assignments. All graduate students are required to attend a safety orientation outlining University, College and Departmental safety guidelines and regulations. **This orientation is typically held at the beginning of each fall semester.** In addition, students are required to take safety refresher courses EVERY year.

Critical Path to the Ph.D. Degree

The student must accomplish several activities in the process of acquiring the Ph.D. degree. The flowchart on the following page summarizes the chronological steps that must be followed in this process. Deadlines associated with each of these steps are given in Chapter VIII.

CRITICAL PATH TO THE DOCTOR OF PHILOSOPHY DEGREE



GOAL OF THE DOCTORAL PROGRAM

The Doctor of Philosophy degree is the highest university degree. It is granted to students upon evidence of excellence in research and the demonstration of independent, creative scholarship culminating in a dissertation. Coursework in the doctoral program focuses primarily on the engineering science concepts in the student's major and in certain basic sciences. The graduate research program introduces the student to the techniques, procedures and philosophical attitudes necessary for exploring unknown areas in his/her chosen profession. After receiving the degree, the student is able to identify areas within his/her major suitable for research; identify the current state of knowledge in these areas using literature search resources; propose plans for investigating the area; apply fundamental principals to science and engineering to complete the investigation and teach these skills to others who follow. The student is taught the scientific method by intensely studying a specific research topic. This also yields a more in-depth knowledge of his/her professional major. Often included in the graduate educational experience is an opportunity to teach undergraduates by preparing selected lectures in undergraduate courses, assisting in undergraduate laboratories or serving as tutors.

SELECTION OF A RESEARCH TOPIC

Of paramount importance to a successful doctoral program is the selection of a suitable research topic. **The selection of the research topic is the responsibility of the student.** Students are urged to select a topic and a research advisor early in their program of study, no later than the end of the first year in residence. The advisor selected must meet the qualification required by the DGS. To accomplish this, the student should visit with each faculty member and select an advisor and dissertation topic that matches his/her goals and interests. The department does not guarantee that a student will be selected to work on a specific project offered by a given faculty member. This is particularly true of funded research projects. Several students often desire to work on the same project in these cases. For this reason, the student should identify several projects of interest among those offered by the faculty. In some instances, students propose projects that may or may not be of interest to the faculty. The department does not require faculty to advise students on projects of this nature. In all cases, the student must obtain the agreement of a faculty member to serve as the research advisor and chair of the supervisory or dissertation committee. Likewise, the student is responsible for recruiting faculty to serve as members on the supervisory or dissertation committee.

The research advisor (major professor) works closely with the student to help plan his/her overall program and to coordinate coursework and research activities. Generally, the advisor helps the student select other members of his/her supervisory committees. Frequent contact between the student and the advisor is necessary to accurately define the research project. This helps to ensure that the student's research prospectus is acceptable.

The dissertation topic can be initiated by either the student or the faculty research advisor. Most doctoral research plans include both theoretical analysis and experimental measurements. The Ph.D. student is expected to have a major input in defining the research topic.

Research by nature is not precisely programmed. Often, well-planned experimental designs are unsuccessful. This requires the application of different procedures. For these reasons, students should initiate their dissertation research before they are able to devote full-time to the project. This helps to eliminate unnecessary delays in graduation.

Original work is required for the Doctor of Philosophy degree. One or more research publications or presentations should result from the research project. Throughout their program of study, the student is encouraged to actively participate in efforts to acquire funding in support of the advisor's

research program. The student should assist the research advisor in the preparation of grant proposals to local, state and national agencies seeking funding for the project.

The student-advisor relationship is a vital one during the Ph.D. years, and often continues well beyond them. Each such relationship is unique, and usually offers personal and professional benefits beyond the conduct of the Ph.D. research. These benefits might include meeting important post-degree job contacts, advice on professional development and training in non research-related professional skills (e.g. teaching). It is expected that in most circumstances student-advisor disagreements will be minor and will be amicably resolved by those involved. In the uncommon instances that attempts to resolve disagreements are unsuccessful, the student and advisor are encouraged to meet with the department chair for further assistance in resolving any difficulties.

GENERAL ADMISSION REQUIREMENTS

Regular Admission

To be eligible for regular admission, the student must have a Bachelor's degree in Bioengineering. United States citizens normally will have a minimum grade point average (GPA) of 3.2 out of a total possible 4.0 or equivalent. Foreign applicants normally will be in the top 10% of their graduating class. Students entering with master's degree are required to have a minimum GPA in their master's degree coursework of 3.5 out of a possible 4.0. The Graduate Record Exam (GRE) is required for all applicants. Foreign students must also submit test scores from the Test of English as a Foreign Language Exam (TOEFL). A score of 580 or greater is required for regular admission.

Regular Admission with Deficiencies

Regular admission may also be given to students with a Bachelor of Science degree in another discipline. In this case, however, the student is required to take a number of undergraduate courses to eliminate deficiencies. These courses are in addition to the graduate program of study. *Regular admission may also be given to students who are deficient in English (e.g. TOEFL <580). In this case, however, the student will be required to take and successfully complete courses through the ASU "American English and Culture Program" AECF.* The letter of admission specifies the deficiencies that must be completed before the student is awarded the graduate degree. Students will be required to complete any deficiencies at the first opportunity after admission.

Provisional Admission

Applicants with scholastic records below the standards for regular admission may be admitted provisionally in certain special cases at the discretion of the departmental graduate committee with the approval of the chair of the graduate committee and the department chair. A student admitted with provisional status must make no grade lower than a "B" in their first 12 hours of graduate coursework. Full-time provisional students must take a minimum of nine (9) hours during their first semester in residence. Part-time provisional students may take fewer than nine (9) hours of coursework during their first semester. Failure to do this will result in suspension from the program. Students who meet this requirement are reclassified as a regular graduate student and the regulations governing academic performance for regular students apply. **It is the student's responsibility to see that their status is changed from provisional to regular after having successfully completed these requirements.** A form for this purpose is provided in the appendix.

REQUIREMENTS FOR THE DOCTOR OF PHILOSOPHY DEGREE

The DGS sets certain general requirements for the Doctor of Philosophy degree. In addition to these general requirements, the department sets specific program requirements, which exceed those imposed by the DGS. This section outlines both the general requirements specified by the DGS and the additional requirements specified by the Bioengineering Program.

Grading

Grades are assigned in graduate courses as follows:

A+ 4.33	D No Graduate Credit 1.00**
A Excellent 4.00	E Failure 0.00**
A- 3.67	
B+ 3.33	W Withdrawal*
B Good 3.00	I Incomplete
B- 2.67	X Audit
C+ 2.33	Y Satisfactory
C Passing 2.00	Z Course in progress***

* This grade is given whenever a student officially withdraws from a class.

** This grade cannot be applied to a graduate degree but is included in the calculation of a grade point average.

*** This grade is usually given pending completion of courses such as a thesis, dissertation or practicum. It may also be given in lieu of an "I" for other graduate courses where the incomplete work may take in excess of one year to complete. All grades of "Z" must be changed to "Y" before graduation

A grade of "P" (Pass) in a 400 or higher level course may not appear on a program of study. Grades of "D" or "E" cannot be used to meet the requirements for a degree although they are used to compute the grade point averages. A student receiving a grade of "D" or "E" must repeat the course in a regularly scheduled (not an independent study) class if it is to be included in the program of study. However, both the "D" or "E" and the new grade are used to compute the grade point averages. Grades on transfer work will not be used in computing grade point averages.

Scholarship

To be eligible for a degree in the DGS a student must achieve two grade point averages of "B" (3.00) or better. The first grade point average is based on all courses numbered 500 or higher which appear on the transcript. (Deficiency courses are not included.) The second grade point average is based on all courses that appear on the program of study. Academic excellence is expected of students doing graduate work. Upon recommendation from the chair of the Department of Bioengineering, the Dean of the DSG can withdraw a student who is not progressing satisfactorily.

Good Standing

To remain in good standing, the student must achieve and maintain a minimum GPA of 3.00 or higher GPA in all work taken for graduate credit, AND a 3.00 or higher GPA in **all studies** at ASU.

The Department places a student on academic probation if:

- 1) The student's GPA falls below 3.00 in the approved program of study;
- 2) The student's GPA for all post baccalaureate courses taken at ASU falls below 3.00;
- 3) The student receives a grade of "D" or "E" in a required deficiency course;
- 4) The student receives a grade of "D" or "E" in any course at the 400 level or above; or
- 5) For reasons other than the above, the student fails to make satisfactory progress toward a degree.

The department will recommend that a probationary student not successfully improving their GPA by the end of the next enrollment period be withdrawn from the graduate program.

The DGS recommends a student for withdrawal if:

- 1) The student is on academic probation because their GPA has fallen below 3.00 in the approved program of study or for all post baccalaureate courses taken at ASU and fails to bring the GPA to 3.00 or above by the time the next nine semester hours are completed;
- 2) The student receives a grade of "D" or "E" while on academic probation;
- 3) The student fails to obtain a GPA of at least 3.00 in all courses cited at deficiencies upon admission; or
- 4) The student fails to meet any other conditions imposed as a part of probation.

A student may appeal any action concerning academic probation and withdrawal by petitioning the graduate affairs committee within the student's academic unit.

Misconduct

The highest standards of academic integrity are expected of all students. The failure of any student to meet these standards may result in suspension or expulsion from the university and/or other sanctions as specified in the academic integrity policies of the individual colleges. Violations of academic integrity include, but are not limited to, cheating, fabrication, tampering, plagiarism, falsification or misrepresentation of data or facilitating such activities. The university and colleges academic integrity policies are available in the Office of the Senior Vice President and Provost and the offices of the deans of the individual colleges.

Graduate Credit Courses

Courses at the 500, 600 and 700 levels are graduate credit courses. Courses at the 400 level satisfy graduate degree requirements when appearing on an approved program of study.

Transfer Credit

Transfer of credit is the acceptance of credit from another institution for inclusion in a program of study leading to a degree awarded by Arizona State University. The number of hours transferred from other institutions may not exceed 30 credit hours. Additional restrictions regarding transfer credits are included in the DGS Catalog under DGS Degree Requirements.

Course load

Course load is not to exceed 15 semester hours of credit during each of the two semesters, 6 semester hours during each 5-week summer session or 9 semester hours of credit during the 8-week summer session.

All graduate assistants and associates must enroll for a minimum of 12 credit hours (this may include research credit hours) during each semester of their employment. This departmental requirement exceeds the DGS minimum of six (6) hours. The hours cannot include audit enrollment. A half-time (50%) graduate assistant or associate working 20 clock hours per week may not register for more than 12 hours (13 hours with seminar) of coursework each semester; a one-third time (33%) assistant or associate for more than 13 hours and a one-quarter-time (25%) assistant or associate for more than 15 hours.

During the summer sessions, graduate assistants employed 25% time may enroll for a maximum of 6 semester hours during a 5-week session or 9 hours during an 8-week session; those employed 50% may enroll for a maximum of 5 hours during a 5-week session or 7 hours during the 8-week session and those employed 100% time may enroll for a maximum of 3 hours during the 5-week session or 4 hours during the 8-week session.

All graduate students doing research, working on theses or dissertations, taking comprehensive final examinations or using university facilities or faculty time, must be registered for a minimum of one hour of credit that appears on the program of study or is an appropriate graduate level course.

Graduate Student Orientation

All new entering graduate students are required to attend a departmental graduate student orientation meeting. The meeting is held the week prior to the beginning of classes of the student's semester in residence. This is normally held in the fall; however, students admitted during the spring semester will need to attend the fall meeting if there was no meeting during their first semester. During this orientation meeting, students are advised regarding departmental policies and are given initial advice regarding registration for courses. Students also meet individually with the graduate student program advisor to obtain advice regarding which graduate courses should be taken and to have their registration forms signed.

Program/Comprehensive Examination/ Dissertation Committees

As described in the Graduate Catalog, each student interacts with three committees appointed by the dean of the DGS - the Program Committee, the Comprehensive Examination Committee, and the Dissertation Committee. It is expected but not required that these three committees will have essentially the same membership. In the following sections of this handbook, however, these committees and their functions will be described independently.

Program Committee

As soon as possible after entry into the doctoral program, and **no later than the end of the first semester in residence**, the student should obtain the consent of at least three faculty members (one as chair) to serve as the students' program committee. A departmental form for this purpose is included in Appendix 6. The Department Chair then recommends the appointment of this committee, for approval by the Dean of the DGS. The program committee advises the student in planning the program of study. The program of study submitted to the DGS is reviewed simultaneously with the recommendation for the program committee. It is recommended, but not required, that the student's research advisor be selected as Chair of the Program Committee.

Comprehensive Examination Committee

When applying to take the Comprehensive Examination (copies of the departmental form for this purpose and a sample of the DGS form are included in the appendix), the student must obtain the consent of both the student's primary advisor and the comprehensive examination committee, which is appointed by the chair of the department. The sole duty of the comprehensive examination committee is to administer the comprehensive exam.

Dissertation Committee

The student should obtain the consent of at least five faculty members (one as chair) to serve on this committee, and submit the "Request for Approval of the Doctoral Degree Dissertation Committee" form (a copy of this form is included in the appendix). The department chair then recommends the appointment of this committee, for approval by the Dean of the DGS. Generally, the chair of the dissertation committee is the student's research advisor. At least one member must be a resident faculty member outside of the Department of Bioengineering. Individuals who are not members of the ASU resident faculty may be appointed to a supervisory committee as a main or extra member. Such appointments must be consistent with quality graduate training and must be recommended by the chair of the department. A vita for this individual must be submitted to the DGS with the department chair's recommendation. In instances where the student selects an individual who is not a member of the Department of Bioengineering as a research advisor and chair of the dissertation committee, a co-chair must be appointed. The co-chair must be a member of the regular tenure-track faculty of the Department of Bioengineering. When the student elects to have co-chairs, a letter outlining the responsibility of each co-chair must be submitted to the chair of the graduate committee in the Department of Bioengineering. Generally, one co-chair is responsible for the student's research program; the second co-chair is responsible for the student's program of study and the enforcement of departmental policies and requirements. In the case of doctoral dissertation committees, students are encouraged to select a research advisor from among the regular tenured faculty within their major. The dissertation committee approves the subject and title of the dissertation, advises the student during the course of the research and the dissertation writing. The committee meets for the presentation and defense of the student's dissertation prospectus, for the oral defense of the dissertation, and upon request of the student or the committee chair to consult with the student on the progress of the research and dissertation.

Program of Study

The student is required to file a preliminary program of study with the Department of Bioengineering. It must be filed with the department no later than the end of the first semester of residence. A departmental form for this purpose is included in the appendix. Changes in the planned program may be made with the approval of the student's program committee and the approval of the chair of the Department of Bioengineering. In addition to this departmental requirement, an official final program of study should be submitted as early as possible to the DGS

on the required DGS form. A copy of this form is also included in the appendix. The DGS Program of Study form must have the approval of the student's program committee, the chair of the Department of Bioengineering, and the dean of the DGS.

Course Requirements

The program of study for students pursuing the Doctor of Philosophy degree with the major Bioengineering consists of a minimum of 84 semester hours of graduate-level courses with the following specific requirements:

Required Bioengineering Courses

Doctoral students are required to complete the following core curriculum:

All students must complete the following three courses (9 credits)-

- BME 598 Engineering Models for Physiological for Engineers (4)
- BME 598 Modeling for Molecular/Cellular Engineering (4)
- BME 598 Scientific Processes (1)

All students must complete the two courses listed in one of the following tracks (8 credits)

Neural Engineering Track

- BME 598 Introduction to Neural Engineering (4)
- BME 598 Computational Neuroscience (4)

Molecular Cellular and Tissue Engineering Track

- BME 598 Advanced Bioengineering Transport (4)
- BME 598 Advanced Biomaterials (4)

Bioimaging and Bioinformatics Track

- BME598/BMI591: Introduction to Biomedical Informatics (4)
- BME598/BMI591: Biomedical Imaging Informatics (4)

Total Semester Hour Credit = 17

Technical Electives

No fewer than nine (9) semester hours semester hours of coursework (as determined by the student's supervisor committee) must be selected from the list of 400-700 level courses that were not selected as required Bioengineering courses. These courses are subject to approval by the student's supervisor committee on the program of study. No more than one of these courses may be 400 level.

Research/Dissertation

The student must register for a total of 52 semester hours of research and dissertation. No more than 24 of these semester hours may be dissertation hours. The DGS requires that 12 semester hours of dissertation (BME 799) be taken after the student is admitted to candidacy.

Seminar

Graduate students are required to register for a minimum of 6 credits of BME 591 (seminar).

Total Requirement

A minimum of Eighty four (84) semester hours is the total course/seminar/research/dissertation requirement. Total hours is determined by the student's supervisor committee.

Transfer Credit

Students with a Master's Degree in Bioengineering from another institution may transfer 30 semester hours of credit towards the course requirements for the Doctor of Philosophy degree with the approval of the departmental graduate committee. The overall course credits, however, must conform to the above requirements. The student must have credit for the Bioengineering core courses, an adequate amount of mathematics and sufficient Bioengineering graduate electives regardless of the institution where they were taken. The DGS requires at least 54 hours of the program of study are taken at ASU.

Transition Program Requirements

Students without a Bachelor's degree in Bioengineering and without the equivalent of the following courses in their undergraduate program of study are deficient in some skills needed for graduate study in Bioengineering. These courses must be completed in addition to the required graduate coursework. In addition, the student's supervisory committee may outline additional transition program requirements to ensure that the student can successfully pass the qualifying and comprehensive examinations.

Mathematics and Basic Sciences

- Mathematics: Calculus through "Ordinary Differential Equations" (e.g. MAT 270, 271, 272 AND 274; typically at least 13 semester hours credit total).
- Physics: One year of calculus-based physics including laboratory (8 semester hours).
- Biology: Minimum of one "General Biology" course, preferably upper division (4 semester hours).
- Chemistry: Minimum of one Chemistry course including laboratory (4 semester hours).
- Computers: Demonstration of computer literacy (e.g. via course, exam).

General Engineering Fundamentals

Students without the equivalent courses must complete additional course work in four of the following six topics:

- Thermodynamics
- Fluid Mechanics

- Mechanics of Rigid Bodies
- Electrical Networks
- Signals and Systems
- Materials Science and Engineering
- Any other course work that is a prerequisite for a course in the student's graduate program of study.

Students should be aware that their research advisor might impose other course requirements. These courses vary depending on their specific field of research. For example, BME 334 "Heat and Mass Transfer" is a common prerequisite for Chemical Engineering related courses of study, ECE 334 "Electronic Devices" for Electrical Engineering related fields, and ECE 313 or ECE 314 "Deformable Solids" for Mechanical Engineering related research. Additionally, students without undergraduate degrees in Bioengineering or a closely related engineering discipline may have to take additional engineering course work in preparation for the comprehensive examination.

Foreign Language Requirement

None.

Comprehensive Examination

To achieve Ph.D. candidacy, a student is required to request permission from the DGS to take the comprehensive examinations. A copy of the Departmental and DGS forms is provided for this purpose in Appendix 2. These examinations are designed to test the student's mastery of the field of specialization. The comprehensive exam committee administers the exam. Failure in the comprehensive examination is considered final unless the committee administering the exam and the head of the academic unit recommend and the dean of the DGS approves a re-examination. A re-examination may be administered no sooner than three months and no later than one year after the date of the original examination. Only one re-examination is permitted. Students failing the re-examination will be removed from the degree program.

The student is required to take the comprehensive examination after the first year after entering the program but no later than two years after entering the program. The comprehensive examination is designed to test the student's knowledge of the core graduate courses and their ability to develop a research plan to study an interesting research question in their selected sub-discipline of Bioengineering.

The comprehensive exam is administered in two parts. The first part is a written exam which requires of submission of a writing portfolio that consists of these writing samples, 1 RO1 style proposal, 1 article manuscript style report, and 1 project report from the PhD core curriculum. This writing portfolio is submitted to the students Comp Exam Committee. At least 1 week after submission of the written portfolio, an oral exam will be administered by this same exam committee.

Dissertation Prospectus

The student must request in writing permission to present the dissertation prospectus no later than one month prior to the proposed date for presentation of the prospectus. A departmental form for this purpose is provided in the appendix. The dissertation prospectus should be presented 1 year

after successfully passing the comprehensive exam but must be presented no later than three years after the student enters the program. The prospectus must include a pertinent review of the literature related to the student's research topic; a statement of the proposed research; a discussion of the significance of the research; a statement of the hypothesis/hypotheses to be tested; a description of the research methodology; a discussion of the specific data to be collected; a description of the means by which the data will be analyzed and, most importantly, a review of safety issues related to the research. The prospectus should be written in the format of an RO1 NIH grant proposal. The oral defense of the dissertation prospectus is designed to test the student's overall comprehension of the problem selected for investigation and to identify weaknesses in the student's background so that appropriate additional coursework might be suggested. It also provides a forum for the student to receive input and advice from experienced researchers. Approval of the prospectus implies that the proposed research is suitable for the Ph.D. degree and can be accomplished with the resources available. It does not guarantee that the student's effort in conducting the research will in all cases satisfy degree requirements. It is the responsibility of the candidate to write the prospectus proposal without the aid of others.

Guidelines for Conducting the Dissertation Prospectus

A rough draft of the prospectus may be shown to the student's research advisor for approval of content prior to scheduling the oral presentation. The oral presentation of the dissertation prospectus is made to the student's dissertation committee. Other interested members of the faculty are invited to attend the presentation but are invited to leave prior to questioning by the dissertation committee begins. The student's presentation should take advantage of appropriate audio visual aids and should be limited to no more than 50 minutes. Copies of the written dissertation prospectus must be distributed to all members of the student's dissertation committee no later than one week prior to the oral presentation. One copy of the dissertation prospectus must be deposited in the departmental office and be available for review by members of the department and the scientific community.

In the oral examination, the student is expected to defend their prospectus and justify that the proposed research is of the acceptable quality and magnitude consistent with quality doctoral education. Following the oral presentation of the research proposition, questions are welcomed from members of the departmental faculty. Following general questions, departmental faculty members other than those on the student's dissertation committee are excused and the student's dissertation committee and interested faculty from the student's major will remain to ask questions of the candidate regarding his proposed research.

Generally, the oral discussion of the dissertation prospectus is limited to three hours. If necessary, however, the proceedings may be adjourned and rescheduled for a mutually convenient date within one week. Only one adjournment is permissible.

After questioning, the candidate is excused from the room while the dissertation committee conducts its deliberations. The decision regarding whether or not the dissertation prospectus is acceptable is the decision of the dissertation committee alone. The student's dissertation committee conveys its evaluation of the acceptability of the dissertation prospectus to the chair of the departmental graduate committee via the special form provided in the appendix.

If the student's dissertation prospectus is unacceptable, the chair of the dissertation committee formulates recommendations for future action and submits them to the chair of the departmental graduate committee and the chair of the department. Either of two recommendations is possible:

- A re-examination may be scheduled and the entire process repeated, or

- The student may be removed from the doctoral program. The results of the dissertation prospectus presentation are conveyed to the student by the chair of the departmental graduate committee.

Admission to Candidacy

Doctoral students should apply for admission to candidacy immediately after they have met ALL requirements for the degree except the dissertation. These requirements include the comprehensive examination, approval of the dissertation prospectus, and completion of the required coursework in the program of study. The student applies for candidacy by submitting a form provided by the DGS. This form is in the appendix. The student must simultaneously submit the final program of study using the DGS form provided in the appendix. The DGS requires that a minimum of 12 semester hours of 799, Dissertation, must be taken after the student is admitted to candidacy.

Oral Defense of the Dissertation

The final oral examination in defense of the dissertation is mandatory and must be held on the campus of Arizona State University. The dissertation committee with the approval of the dean of the DGS schedules the oral defense. A DGS form for this purpose is included in the appendix. The DGS requires that the oral defense of the dissertation be published in the university bulletin, "Insight", to ensure that the university community is invited to attend. The oral defense of the student's dissertation is a formal occasion and the student should treat it as such by dressing appropriately and scheduling the meeting for an appropriate seminar room. It is the responsibility of the student to arrange for all audiovisual aids and to schedule the room location.

At the beginning of the examination, the student's research advisor introduces the student and the topic of their research to the general audience. The student is then expected to present a brief seminar outlining the results of their research. The presentation should be limited to 30 minutes. Following the presentation by the student, the general audience is invited to ask questions. Following this question and answer session, the general audience is excused and the student's dissertation committee continues to question the student in depth regarding his/her research findings. The student should be prepared to defend the research methodology used in the study and the results obtained.

The oral defense of the dissertation is limited to a period of three hours. If necessary, however, the proceedings may be adjourned and rescheduled for a mutually convenient date within one week. Only one adjournment is permissible. When the dissertation committee completes its questioning, the student is asked to leave the room and the supervisory committee discusses whether or not the student successfully defended their research and whether or not the completed dissertation is acceptable.

LEVEL OF PASS OR FAIL

Pass: Only minor format corrections need to be made (e.g., typographical errors, and pagination). At the conclusion of the defense, 1) the committee chair should indicate "pass" and briefly describe needed revisions, and 2) all committee members should report the examination results at the bottom of form and sign the thesis approval page.

Pass with minor revisions: Extensive format/editorial corrections and/or minor substantive changes need to be made (e.g., rewrite some text, correct grammatical errors). At the conclusion of the defense, 1) the committee chair should indicate "pass with minor revisions" and briefly describe revisions, and 2) the committee members, not including the chairperson, should

report the examination results at the bottom of the form and sign the thesis approval page. 3) After revisions are made, the chairperson should report the exam results at the bottom of the form and sign the thesis approval page.

Pass with major revisions: Extensive substantive changes need to be made (e.g., chapter rewrite). 1) At the conclusion of the defense, the committee chair should indicate "pass with major revisions" and briefly describe revisions. 2) After revisions are made, all committee members should report the examination results at the bottom of the form, and sign the thesis page.

Fail: The basic design and/or overall execution of the study are flawed or the candidate's performance in the oral examination is seriously deficient. At the conclusion of the defense, 1) the committee chairperson should indicate "fail", and 2) all committee members should report the examination results at the bottom of the form. The thesis approval page should not be signed.

If the student fails, the dissertation committee in consultation with the chair of the committee (student's research advisor) formulates recommendations for future action and recommends them to the chair of the departmental graduate committee and the chair of the department. Two recommendations are possible:

- A re-examination may be scheduled following the completion of recommended activities, or
- Research may be judged unacceptable and the student removed from the graduate program.

The results of the oral defense are conveyed to the student by the chair of the supervisory committee or dissertation committee, whichever is appropriate. The results are transmitted to the Graduate College on the "Announcement & Report for Doctoral Dissertation Defense" following the approval of the chair of the Department of Bioengineering.

Applying for Graduation

The student is eligible for graduation when the DGS scholarship requirements are met, the final oral examination is passed and the dissertation is approved by the supervisory committee and accepted by the Chair of the Department of Bioengineering and the Dean of the DGS; and after the required number of dissertation copies are submitted to the bookstore for binding.

Application for graduation should be made no later than the date specified in the DGS calendar (Refer to DGS website for current information). All fees are payable at this time. The student applies for graduation by

- Paying a \$25 graduation fee at the Cashier's Office in the Student Services Building
- Taking the receipt to the Graduation Office, and
- Completing the Application for Graduation form provided by the Graduation Office.

An additional \$25 late fee will be assessed if these procedures are completed after the date specified in the Graduation Catalog calendar. If the student wishes to apply the filing fee to a subsequent semester, he/she must withdraw the application no later than the application deadline. During the summer, the graduation application must be withdrawn by the last day of the five-week summer session. If a student does not complete all degree requirements by the date of graduation

for which he/she has applied and has not withdrawn the application by the designated time, a \$25 fee must again be paid to reapply.

Maximum Time Limit

Once admitted, the Ph.D. student must be enrolled continuously, excluding summer sessions, until all requirements have been fulfilled. If a program of study must be interrupted, the student may apply for leave status. The approved petition must be filed no later than the last day to register for classes in the semester for which the student is requesting a leave. A student who interrupts a program without obtaining leave status may be removed automatically from the program.

The candidate must take the final oral examination in defense of the dissertation within five years after passing the comprehensive examination. Any exception must be approved by the supervisory committee and the dean of the DGS and ordinarily involves repetition of the comprehensive examinations.

DEADLINES FOR THE DOCTOR OF PHILOSOPHY DEGREE

It is the graduate student's responsibility to see that all graduate program deadlines and requirements are met. To aid the student in an efficient and timely progression through the doctoral program, the following calendar of activities is provided.

Activity/Degree Requirements

1. *Orientation*. All new and continuing graduate students are required to attend a departmental graduate student Orientation meeting.

2. *Registration Advisement*.

3. *Selection of Program Committee* (departmental form)

4. *Preliminary Program of Study* (departmental form)

5. *Appointment of a Dissertation Committee*

6. *Final Program of Study* (DGS form)

7. *Request to Take the Comprehensive* (departmental form)

8. Qualifying/Comprehensive Examination

9. *Request to Present the Dissertation* proposed *Prospectus* (departmental form)

10. Dissertation Prospectus (Dissertation the Proposal)

11. *Admission to Candidacy* (DGS form)

12. *Format Evaluation of the Dissertation* (DGS form)

13. *Application for Oral Defense of the Dissertation* (DGS form)

14. *Graduation*. The student must apply

Deadlines

Week prior to the beginning of each semester

Prior to registration each semester

No later than the end of the first semester of residence.

No later than the end of the first semester of residence.

No later than second semester in the program

No later than the end of the second semester of residence.

During the semester during which the exam will be administered.

After second semester in the program but no later than two years following admission to the program (department and DGS forms)

No later than one month prior to the date for the presentation of the dissertation prospectus.

Not later than three years following admission to graduate program.

After all requirements for the degree have been met except the dissertation.

Ten (10) working days before the oral defense.

Ten (10) working days before the oral defense.

See DSG website for most current information.

for graduation with the graduation office

Other dissertation requirements. The student must submit three copies of the dissertation to the ASU Bookstore for binding. Bound copies are placed in the University Library, department office, and Archives. Bound copies of the dissertation are also prepared for the student's research advisor. Doctoral candidates must also submit one copy of the title page and one copy of the abstract (which must not exceed 350 words) to the bookstore. The student is responsible for the binding fees. Doctoral students must also pay to have their dissertations microfilmed by University Microfilms International (UMI).

Other requirements. Keys must be returned, all departmental property must be returned, samples and notebooks must be turned over to the advisor, wastes must be disposed of and the student's desk must be cleaned out. Forwarding address must be filed with post office and the student must submit copy of address to department to forward first class mail for a period of a month after the degree conferral date.

FINANCIAL SUPPORT

Financial support for graduate students in the Department of Bioengineering is available from several sources. These include research assistantships, teaching assistantships, and academic scholarships.

Teaching Assistantships

Some teaching assistantships may be available to qualified individuals. (All teaching assistants whose native language is not English must achieve a Test of Spoken English (TSE) score of 230 or better before they are allowed primary teaching responsibilities. The TSE is offered on the ASU campus as the SPEAK Test. Students receiving teaching assistantships may be assigned appointments that are half-time (20 hours per week) or quarter-time (10 hours per week). Assignments may include sole responsibility for the teaching of undergraduate laboratories, assistance in the teaching of undergraduate laboratories or assistance in the grading of undergraduate homework. Occasionally the student may be asked to prepare specific lectures in undergraduate courses and administer examinations. Teaching responsibilities are in addition to the time spent on research for the graduate degree. Teaching assistantships often are also available in other departments at the University. This includes, for example, Chemistry, Mathematics and Computer Science. A tuition waiver is usually given to students awarded graduate assistantships.

Research Assistantships

Research assistantship appointments pay the student a stipend to participate in a particular research project that may serve as his/her thesis research topic. Research assistantships may also be available for projects that will not serve as the student's research topic. A tuition waiver is usually included. The research assistant may be appointed 50% time (20 hours per week) or 25% time (10 hours per week). Students receiving stipends for research activity that also constitutes the dissertation research spend considerably more time each week working on the project than that dictated by the assistantship.

Scholarships

The DGS provides funding for out-of-state tuition waivers and in-state tuition waivers for outstanding students recommended by the department if funds are available. Students apply for these awards provided by the DGS. The completed forms are submitted to the departmental office. Generally students receiving research assistantships or teaching assistantships qualify for out-of-state tuition waivers. Only a very limited number of in-state tuition waivers are available. These are awarded to the students with the most outstanding academic credentials.

Policies Related to Financial Support of Graduate Students

It is the desire of the department to provide financial support for as many students as possible. Financial resources, however, are limited. For this reason, a limited number of students receive written offers of financial aid prior to entering the program. Students who elect to enter the program without a written commitment of financial aid are responsible for providing their own financial support. Although it is the desire of the faculty to assist students by the aggressive pursuit of research grants, the faculty is not committed to provide funding when a student enrolls in

the program without a written commitment from the department chair. All supported students are expected to complete their work assignments in a satisfactory manner as judged by the faculty. Additionally, supported students are required to register for at least 12 semester hours of coursework (4 courses) during each semester of residence. This may include research hours. It is understood that any suspension from the graduate program results in the loss of financial support. Finally, departmental decisions on financial aid are based on consideration of all aspects of each individual student's situation within the framework of these guidelines.

ACCESS TO DEPARTMENTAL STAFF AND FACILITIES

Keys

Keys for the offices and laboratories in the Ira A. Fulton School of Engineering: Engineering Research Center (ERC), J.W. Schwada (SCOB) Classroom Office Building, Interdisciplinary Science and Technology Building 1 (ISTB1), and Goldwater Center (GWC) are obtained by filling out an "Authorization for Key Request" form (available in the office). The Department Chair and the student's research advisor must also sign the form. All keys must be returned before graduation to the Department of Public Safety (DPS).

Telephones

There is a telephone in the office to be used for long-distance telephone calls related to research or teaching duties. A record is kept of all such calls. The departmental telephone number (480) 965-3028 can be given out as a number at which to contact students. Incoming calls for students are taken and the messages posted at the student's mailbox.

Office Equipment

Office equipment such as the paper cutter or typewriter must be reserved through the department secretary. Graduate students are not permitted to use secretarial equipment (computers, printers or typewriters). Student work related to teaching duties or research can be submitted with faculty approval for typing and/or printing, but in general, faculty work receives a higher priority. Students are urged to familiarize themselves with the extensive free computer facilities on campus available for word processing.

Office Supplies

Departmental letterhead and envelopes can be used by students only if the subject matter has to do with departmental business. A faculty member must approve correspondences on departmental letterhead. Office supplies are not given out without faculty approval and must also relate to departmental business.

Staff Time

Some types of personal typing (such as application letters, resumes, forms) may be done on a secretary's personal time (before or after work, during lunch or weekends) for a fee.

Copier

The departmental copier is for faculty and staff use. Faculty may authorize their students to use the copier for teaching duties or for research by issuing their copier access code to the student. Large jobs (greater than 100 copies) require approval by the department's Business Operations Manager. Of course, no personal copying can be done on the departmental machine. Pay copiers are available at many locations on and off campus.

Mailboxes

Mailboxes are established within two to three weeks after the semester begins. External mail addressed to students through the department, Engineering College, and University notices are transmitted to students via the mailboxes. Mail delivery occurs once per day, usually by 12:30 P.M. Please empty your mailboxes weekly.

Miscellaneous

A file of academic openings is kept in the office and can be checked out through a secretary. Notices of interest are often posted on the graduate bulletin board outside the department office, and in the Graduate Student Office. Students may ask to post notices on this board - notices must be stamped with expiration dates before posting.

Misuse of departmental telephones, copiers, supplies, facilities is a serious offense that will lead to disciplinary action. At a minimum, students found to have used departmental resources for non-department approved purposes will be required to reimburse the department for such uses.