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1. INTRODUCTION

This manual is intended to answer common questions that graduate students have concerning their program of study, Graduate School policies, and the Graduate Program in Biomedical Engineering. It provides information on registration procedures, setting up a program of study, acceptable scholastic performance, the procedures and various requirements that must be met to receive the Master's degree.

2. BIOMEDICAL ENGINEERING FACULTY

The core biomedical engineering faculty members at IUPUI are:

- Karen Alfrey**, Ph.D., Rice University, 2000. Computational biology; neuronal modeling; biological control systems
- Edward J. Berbari**, Ph.D., University of Iowa, 1980. Computer-based medical instrumentation, biomedical signal processing, cardiac electrophysiology and biophysical modeling.
- Julie Ji**, Ph.D., University of Pennsylvania 2004. Endothelial mechano-biology, cell and nuclear mechanics, and signal transduction in human disease models.
- Ghassan Kassab**, Ph.D., University of California San Diego, 1990. Vascular biomechanics, coronary artery biology
- Sungsoo Na**, Ph.D., Texas A&M University, 2006. Physical and molecular basis of cell migration and regulation in the cardiovascular system by mechanical stimuli.
- John H. Schild**, Ph.D., Rice University, 1995. Neural mechanisms controlling the heart and the circulation, experimental and computational study of cardiovascular neurophysiology.
- Charles H. Turner**, Ph.D., Tulane University, 1987. Solid mechanics, biomechanics, mechanobiology, bone biology.
- Dong Xie**, Ph.D., Ohio State University, 1998. Polymer biomaterials.
- Hiroki Yokota**, Ph.D., University of Tokyo, 1983 and Indiana University 1993. Biomechanics, bone mechanotransduction, bioinformatics, molecular biology.
- Ken Yoshida**, Ph.D., University of Utah, 1994. Neural engineering, bioinstrumentation.

3. GRADUATE SCHOOL ADMISSION REQUIREMENTS

Students are required to take GRE exams and have an undergraduate GPA of 3.0/4.0 or higher for admission into the program. Graduates of non-U.S. institutions are required to take the TOEFL exam. A minimum of 550 (paper-based test) or 213 (computer-based test) is required for TOEFL.

4. NON-BIOMEDICAL ENGINEERING MAJORS

Graduates with non-biomedical engineering majors or engineering degrees from a non-ABET accredited program may apply for admission to the graduate program leading to the Master of Science in Biomedical Engineering (MSBME) degree upon the completion of the requirements mentioned below.

Mathematics Requirements:

Math 163 Integrated Calculus & Analytical Geometry I
Math 164 Integrated Calculus & Analytical Geometry II
Math 261 Multivariable Calculus
Math 262 Linear Algebra and Differential Equations

Engineering and Science Requirements:

Non-biomedical engineering majors will be required to complete six undergraduate courses, or their equivalents, as listed below:

BME 222 Biomeasurements
BME 241 Biomechanics
BME 322 Probability and Statistics for BME
Biology K324 Cell Biology

Any two of the following courses:

BME 331 Biosignals and Systems
BME 334 Biomedical Computing
BME 381/383 Implantable Materials and Biological Response and recitation
BME 352/354 Tissue Behavior and Properties and recitation

Non- biomedical engineering majors must have completed the courses above or equivalent courses to be admitted to the Program. Equivalence of courses is to be determined by the graduate committee. The student must maintain a grade point average of 3.0/4.0 or higher in these courses. An operational understanding of at least one higher level computer programming language and a command interpreter such as MATLAB are also required.

5. ADVANCE REGISTRATION AND FINAL REGISTRATION

It is possible to pre-register for each semester during the advance registration period in the previous semester. Students already in residence are strongly urged to advance register. New students may advance register if they come to campus during the semester before starting graduate work.

If advance registration is not possible, students should register during the final registration period. Final registration follows the same procedure as advance registration and is held during the week preceding the beginning of classes.

6. LATE REGISTRATION

Any student who has not utilized the advanced registration or the final registration periods must schedule under late registration. This begins on the first day of the new semester and continues for one week. There will be a penalty fee charged by the Bursar's Office.

Dropping/Adding Courses.

Each graduate student is expected to be aware of procedures, late fee charges and refunds deadlines for the dropping and adding of courses. Students may drop/add courses online during the open registration period. However, once the open registration period ends, students must use a Drop/Add form to change a course. Information on procedures and deadlines are available on the IUPUI Registrar's website at <http://registrar.iupui.edu/>

7. ENGLISH REQUIREMENTS FOR INTERNATIONAL STUDENTS

A student whose first language is not English has to take the English for Academic Purposes (EAP) Placement Test. Those students with noted deficiencies are required to take at least one or more EAP courses as recommended by the EAP Program. Unless an exception is granted by the BME Graduate Committee, for all international students will be required to take TCM 360 or an equivalent technical writing course within the first year of their graduate study. These courses will not count towards the degree or be part of the student's Plan of Study.

8. FACULTY ADVISOR AND ADVISORY COMMITTEE

Each graduate student is expected to choose a Faculty Advisor no later than the end of the first semester. If the student is employed as a Graduate Research Assistant this Faculty Advisor will most often be the faculty member sponsoring the MS thesis research project.

Shortly thereafter and in conjunction with the Faculty Advisor the student must establish a Graduate Research Advisory Committee. This committee helps to set up a plan of study and conducts all necessary examinations related to the MS thesis research. Normally the Graduate Research Advisory Committee consists of three members: the Faculty Advisor, another professor who is knowledgeable of the major field of study and a third professor representing a related area of research.

9. PLAN OF STUDY

Each graduate student should file a Plan of Study during the first semester of graduate study in Biomedical Engineering. Students failing to meet this requirement will not be permitted to complete their registration for the second semester. The Plan of Study may be modified after it is filed as noted below. Contact the Graduate Programs Coordinator for the School of Engineering and Technology for guidance in filling out the plan of study.

The Plan of Study is to be filed on form GS-6 which is accessible at the Forms page of the Office of graduate programs website: <http://www.engr.iupui.edu/gradprogs/gradForms.shtml>. It is to be signed by the graduate student and by each Advisory Committee member and then returned to the department. Approval by the Head of the Graduate Programs and the Graduate School, officially registers both the Plan of Study and the Advisory Committee.

Change to the Plan of Study.

To make changes to an approved Plan of Study form GS-13 “*Request for Change to the Plan of Study*” must be completed and filed with the Purdue Graduate School. This form is also used to request for a change of major professor and/or other advisory committee members, or for a change of the Master’s degree option.

10. CREDIT, GRADE AND INDEX REQUIREMENTS

The number of required credit hours for a Master of Science degree in Biomedical Engineering is 30. Only grades of A, B, or C are acceptable in fulfilling graduate school requirements for any plan of study. An advisory committee may require a grade of B or better in certain courses. Pass/fail grades are not acceptable in fulfilling degree requirements. Incomplete course grades must be cleared by the twelfth week of the second semester subsequent to the session in which the incomplete was awarded. Students are required to maintain a cumulative index of 3.0 out of 4.0 by the time of graduation in all courses used toward the degree.

11. COURSE REQUIREMENTS

30 credit hours of course work is required to earn a Master of Science in Biomedical Engineering. The following courses are required for the MSBME degree:

Thesis option:

3 credit hrs	Advanced Mathematics or Statistics
12 credit hrs	Graduate biomedical engineering courses
3-6 credit hrs	Approved life sciences course, or technical elective
6-9 credit hrs	Thesis research

Non-thesis option:

3 credit hrs	Advanced Mathematics
12 credit hrs	Graduate biomedical engineering courses
6 credit hrs	Approved life sciences course, or technical electives
6 credit hrs	Approved engineering electives

Mathematics courses include MATH 510 Vector Calculus or higher-level courses appropriate for science and engineering students. Non-thesis students may receive credit for approved industrial internships. Deviations from above must be approved by the graduate committee and approved by the chair of the biomedical engineering department.

12. MINIMUM GRADE REQUIREMENTS

Good Academic Standing. The Biomedical Engineering department maintains the following minimum standards in order for the student to remain in “good academic standing” as a member of the Master’s degree program.

To be in good academic standing a Master’s graduate student must maintain a cumulative grade point index of at least 3.00 out of 4.00 at the end of both the first semester and over the course of the approved Plan of Study. A graduate student who is not in good standing at the end of a semester is automatically placed on an “*academic checklist*” and issued a “warning letter”. Registration is then restricted and students are required to meet with their advisors and complete the form “Request for Temporary Checklist Clearance” in order for the checklist to be temporarily released for registration the following semester. Should the student’s cumulative grade point index remain below 3.00 at the end of the succeeding semester or summer session the student will be placed on probation. A student in probation may not be permitted to register for further graduate courses, pending an academic review and evaluation by the BME Graduate Committee.

The cumulative grade point index is calculated using the courses that are on the Plan of Study. If a course is taken more than once while the student is enrolled as a graduate student, only the most recent grade received in the course will be used in computing the grade point index. Transfer courses are not included in the computation of the cumulative grade point average. No grade of “D” or “F” is allowed for a course that is on the approved Plan of Study. *All Master’s students must achieve a final cumulative grade point index of 3.00 or higher for courses that are on the Plan of Study.* Any course on the Plan of Study that carries a grade of “D” or “F” must be repeated. In the event of a deficiency in the cumulative grade point index, a course may be repeated but only the most recent grade received will be used in computing the index.

13. CHANGES IN ACADEMIC PROGRAM

It is recognized that as a student’s academic program progresses there may arise conditions that make it necessary to change research and/or make changes to the Plan of Study. Such changes, when based on appropriate academic reasons, are generally acceptable. However, specific regulations must be observed for the change to be approved. These are:

- A course may *not* be removed from an approved Plan of Study once the course has been taken and a grade of “D” or lower has been received. This is a Purdue Graduate School rule.
- Any change to a Plan of Study requires approval of the student’s advisory committee and the Chair of the Graduate Committee.

14. INACTIVE ACADEMIC STATUS

Students who do not enroll in classes for three (3) consecutive academic sessions, including summer sessions, will be automatically placed in *inactive academic status*.

Students who have been placed in inactive academic status are required to submit a new graduate application for re-admission to the program before they are permitted to enroll again. Completing and submitting a new application is a formal procedure to reactivate inactive academic status. All other supporting application materials are *not required* for re-admission.

Students should wait for their applications for re-admission to be officially approved by the Purdue University Graduate School before enrolling for classes. Registration activities that take place while in "inactive academic status" and before a new application for re-admission had been officially approved by the Graduate School are considered invalid registrations and will not count toward graduate credit.

15. PREPARING THESIS AND FINAL EXAMINATION

- All students preparing thesis and final examination (formal oral defense) *must attend* a "thesis/defense preparations briefing session" regularly offered by the Office of Graduate Programs in the School of Engineering and Technology. Each MS student is expected to complete this briefing prior to composing the first draft of the thesis, which should be at least 2 – 3 months before the expected final examination (defense) date.
- All requirements and deadlines must be met for successful completion of final examination and thesis deposit for graduation.
- Submit the first draft of your thesis to your Faculty Advisor at least one month before your final examination (defense).
- You must complete and submit form GS-8 "*Request for Appointment of Examining Committee*" to the Graduate Programs Coordinator at least three weeks prior to your final examination (oral defense) date. The Purdue Graduate School requires that the time and place of the final examination be registered at least three weeks in advance of the defense date.

You must obtain forms GS-7 "*Report of Master's Examining Committee*" and GS-9 "*Purdue University Graduate School Thesis Acceptance GS-9*" from the Graduate Programs Coordinator for completion following your final examination.

- You must use the Purdue Graduate School's "*Manual for the Preparation of Graduate Theses*" in preparing your thesis which can be found at:
<http://www.purdue.edu/GradSchool/Publications/graduate-thesis-manual.pdf>

It is incumbent upon the student to adhere to the requirements and guidelines stated in the manual. The Purdue Graduate School will not accept a thesis that has improper or inappropriate formatting. In such cases the thesis will be returned to the student for revision before the MS degree can be conferred.

- Purchase 3 sets of Purdue thesis black binders and 100% white cotton paper (20 lb weight) early. The IUPUI bookstore does not carry many of the black binders and quickly runs out of them towards the end of the semester. Students must submit 3 bound theses – a cotton copy for the Purdue Graduate School, a cotton copy for the IUPUI Library, and a regular copy for the biomedical engineering department.
- Check with your research advisor whether your thesis needs to be kept confidential. If confidentiality is required for your thesis form GS-15 “*Request for Confidentiality*” must be filed with the Graduate Programs Coordinator upon completion of the oral defense.
- The student must personally meet with the Graduate Programs Coordinator for verification of thesis document format.
- Thesis for the Purdue Graduate School must be deposited at the IUPUI Graduate Office by the published semester deadline. Contact the IUPUI Graduate Office to make an appointment at least one week in advance of the deadline for thesis deposits.
- Allow yourself extra time (minimum 2 days) for final formatting revisions before your scheduled thesis deposit.

16. FINAL EXAMINATION COMMITTEE

A Final Examining Committee, consisting of a minimum of three members, is appointed upon request of the student’s Faculty Advisor. Normally, the membership is identical to the Advisory Committee. The members of this committee evaluate the thesis and conduct the examination. A copy of your thesis should be delivered to the Examining Committee members at least one month prior to the Final Exam.

Students for whom a Final Exam report is not received by the deadline will not graduate in the semester. The student should contact his/her Faculty Advisor early in the program to find out whether a formal final examination will be required by the Advisory Committee.

17. STEP BY STEP PROCEDURE

Listed below are the various steps, which must be taken along the path toward a Master's degree.

- A. Before registration, report to your Faculty Advisor. If you do not already have a Faculty Advisor, report to the Chairman of Biomedical Engineering.
- B. Register.
- C. During the first semester, and before filing a Plan of Study, check with the Chairman of Biomedical Engineering to see if you have met the English Proficiency requirements.
- D. Choose a Faculty Advisor and a Graduate Research Advisory Committee.
- E. Before the end of your first semester, work out a Plan of Study in detail with your Faculty Advisor and your Graduate Research Advisory Committee.
- F. File a Plan of Study with the Biomedical Engineering department and the Purdue Graduate School. Forms can be obtained from the Office of Graduate Programs website. This must be completed before the end of the first semester or registration for the second semester will not be permitted.
- G. If necessary, complete all English Proficiency requirements. This must be done before the Graduate School will approve your Plan of Study or the appointment of your Graduate Research Advisory Committee.
- H. Submit any request for a change of Plan of Study to the Graduate School before classes begin in the semester you plan to graduate. The Plan of Study must be in its final form and received by the Graduate School before the first day of the last semester in order to be eligible for graduation.
- I. Follow the steps outlined in Sections 15 and 16 for processing your thesis and taking your final examination.