



# RICE<sup>®</sup>

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## **Department of Bioengineering**

### **Graduate Degree Requirements and Procedures**

The Bioengineering Graduate Program offers programs of graduate study leading to a professional Masters in bioengineering (MBE) degree, and the Doctor of Philosophy (PhD) degree. A joint MD/PhD is offered between the Rice Department of Bioengineering and Baylor College of Medicine. Few students interested solely in a Master of Science (MS) degree are admitted and only under special circumstances.

Department of Bioengineering

Chair: Rebecca Richards-Kortum, PhD

Graduate Academic Affairs Committee Chair: A. G. Mikos, PhD

MBE Program Committee Chair: K. J. Grande-Allen, PhD

Updated: August 2012

<p>Students are responsible for meeting all program and university requirements. A student failing to meet department or university requirements is subject to dismissal from the program. Students are advised to consult the Rice University General Announcements for additional information or revisions.</p>
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## Preface

The policies outlined in this *Handbook* pertain to graduate students in the Ph.D, M.S. and M.B.E. level in the Department of Bioengineering. In care of error, omission, or conflict, policies of the General Announcements supersede those stated here. If the policies of the Program change during a student's tenure at Rice University, the student can elect one of the two following options:

1. Continue studies under the complete set of policies in place at the time of his/her matriculation into the program
2. Continue studies under the complete set of new policies

Students must choose one set of policies or the other; they may not pick and choose policies from each group. In rare cases, the faculty may apply a new regulation to all students who have not passed a specific milestone (i.e. candidacy) in their program if such a change will not materially affect the progress of the students.

The Graduate Academic Affairs Committee and the MBE Committee reserve the right to correct typographical errors in these policies at any time without giving students the above choice.

It is the student's responsibility to be familiar with the rules, procedures, and requirements of the Department, Graduate and Postdoctoral Studies, and Rice University. It is the ultimate responsibility of the student to make sure that these policies and timelines are followed in order to allow for a timely graduation.

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## Department of Bioengineering

### Graduate Degree Requirements and Procedures

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#### I. The PhD Program

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A) **Prerequisite Courses:** The following courses are required prerequisites. If a student does not have evidence on their undergraduate transcript that they have received credit for these courses, they must take them as part of the PhD curriculum.

- Fundamentals of Systems Physiology (BIOE 322 or equivalent; 3 credit hours)
  - Cell Biology (BIOC 341 or equivalent; 3 credit hours)
  - Statistics (3 credit hours)
- 1) Only one prerequisite course may be counted towards the 30 credit hours of foundation, supporting, and advanced topic courses required for the PhD degree. This course must be a graduate level course and taken for a standard letter grade. (Exceptions: BIOC 341, BIOE 322 or a 400 level or above statistics course may be taken with a standard letter grade to meet prerequisite requirements and counted toward the 30 required hours.)
  - 2) If more than one prerequisite is required, additional courses, other than BIOE courses, may be taken for a standard letter grade or pass/fail credit, however, these courses will not count toward the required 30 credit hours of foundation, supporting, or advanced topic courses regardless of the grade mode. (University policy does not allow graduate students to take a course offered by their home department on a pass/fail basis.)

#### B) **Curriculum**

- 1) **Components of Curriculum:** The PhD curriculum consists of three components: foundation, advanced topic, and supporting (track) courses. Collectively these courses afford the student broad exposure to his or her chosen field of research interest.
  - (a) Students must take a minimum of 30 credit hours of graduate level foundation, supporting (track) and advanced topics courses (graded for a standard letter grade.)
  - (b) A minimum of 15 credit hours of graduate level BIOE courses must be included in the foundation, supporting, and advanced topics courses. (See Appendix 2 for a list of graduate level bioengineering courses.)
- 2) A minimum of 18 of the 30 required credit hours must be taken at Rice. The number of hours which may be transferred from a different institution is 12.

3) **Foundation Courses:** The following foundation course are required of all PhD students:

- Principles of Bioengineering I (BIOE 561; 3 credit hours)\*
- Principles of Bioengineering II (BIOE 562; 3 credit hours)\*  
\*BIOE 561 and BIOE 562 should be taken consecutively during the first two semesters of graduate study.
- Training in the Responsible Conduct of Research (UNIV 594; 1 credit hour)
- Life Sciences Entrepreneurship (BIOE 633; 1.5 credit hours) or Professional Development for Bioengineering (BIOE 590; 1.5 credit hours)
- 400 level or higher mathematics (MATH), statistics (STAT) or computational and applied mathematics (CAAM) course (3 credit hours). Exception: Introduction to Partial Differential Equations (Math 381) or Complex Analysis (Math 382) may be used to meet this requirement and may be counted toward the 30 required credit hours.

4) **Advanced Topic Courses**

- (a) A large array of advanced specialty courses is available to BIOE graduate students. Each student should select the courses most appropriate for his or her research work in consultant with his or her thesis advisor.
- (b) Advanced topic courses may be used to meet the minimum of 15 credit hours of graduate level BIOE courses.

5) **Supporting (Track) Courses**

Students may elect a specialization track during their graduate studies. To fulfill the requirements of the track, students must take three supporting courses in the area of interest. The student must consult with his or her advisor regarding appropriate courses to support their chosen track. Six major tracks that reflect research interests within the Bioengineering Department are recognized:

- Translational Bioengineering Cancer Research
- Molecular, Cellular, and Tissue Engineering
- Bioimaging and Optics
- Biomaterials, Biomechanics, and Tissue Engineering
- Computational and Theoretical Bioengineering
- Nanobiology

6) **Graduate Seminar Courses**

- (a) Students must register for the graduate seminar courses, BIOE 698 (fall) and BIOE 699 (spring) each semester of their first three years of study.

- (b) BIOE 698/699 cannot be double-booked with another course. If a student is taking another course or has a TA assignment that conflicts with BIOE 698/699, they should postpone taking BIOE 698/699 until the next semester. (Exception: Students may double-book BIOE 699 and BIOE 633 (Life Science Entrepreneurship). If a student elects to do this, the student must assure they meet all requirements of both courses.
- (c) Seminars will be given by leaders from the field of bioengineering. These courses are graded on a “satisfactory/unsatisfactory basis only. Attendance at seminars is mandatory unless the absence has been excused in advance by the course instructor. Graduate students may have a maximum of two approved absences per semester. The course administrator should be notified of absences.
- (d) Students are expected to arrive on time and remain for the entire seminar to receive credit for attendance. In general, there will be a time scheduled for graduate students to meet with the seminar speakers for an informal discussion. Attendance at the informal discussion session is not mandatory but is strongly recommended.
- (e) Use of laptop computers and electronic tablets are not allowed during the seminar course.
- (f) Students beyond their third year of study, who have six credit hours of seminar courses recorded on their transcript, are not required to attend but are highly encouraged to do so.

**C) Course Requirements:**

- 1) PhD students entering Rice with a bachelor’s degree must take at least 30 semester hours of graduate level foundation, supporting, and advanced topics courses for a standard letter grade.
- 2) Students must take a minimum of 15 credit hours of graduate level BIOE courses for a standard letter grade (Waived courses will count toward the required 30 credit hours, however, they do not count toward the required 15 BIOE credit hours. If a BIOE course is waived, another BIOE course must be taken to meet the minimum 15 credit hours requirement.)
- 3) All coursework must be at the graduate level.
- 4) Students must receive a grade of B- (2.67) or above in all course work counted toward their coursework requirements. Courses in which a student receives a grade below a B- (2.67) may not be used to fulfill the coursework requirements.
- 5) During their first semester in residence, all full-time PhD students must take at least four advanced courses for a standard letter grade and not including any courses taken on a “pass/fail” or “satisfactory/unsatisfactory” basis. (Exception to Requirement: Students in the MD/PhD program or students who have received credit for graduate courses taken during their MS studies may petition the Graduate Academic Affairs Committee to relax the requirement for registering for four advanced courses during the first semester.)

- 6) After the first semester, students should register for enough advanced courses so that they meet, at all times, the satisfactory progress requirements outlined in Section I. H.: *Satisfactory Progress*.
- 7) PhD students entering Rice with a master's degree or students who have taken graduate level courses as an undergraduate may petition the Graduate Academic Affairs Committee to receive credit for graduate courses taken. To do this, students should submit a petition and copies of all relevant transcripts to the Graduate Academic Affairs Committee. No course may be used to satisfy both an undergraduate and graduate degree requirement.
  - (a) Such credit will not exceed 12 semester hours and these students must take at least 18 credit hours of advanced courses at Rice.
  - (b) The following restrictions also apply:
    - Each case must be individually approved by the Graduate Academic Affairs Committee based on the work done for the MS degree.
    - A student may not subsequently count toward the PhD requirements a course which is substantially the same as one completed during the MS work. The decision as to whether a course is "substantially the same" will be made by the Graduate Academic Affairs Committee.
    - As with all graduate students, the thesis advisor or thesis committee may require further course work if it is considered essential to the thesis research.
- 8) Students with an MS or MBE degree in bioengineering from Rice granted within three years prior to their entry into the PhD program may have all relevant courses taken during their MS or MBE work at Rice counted toward the 30 credit hours required for the PhD degree.
- 9) MD/PhD students in the Medical Scientists Training Program may waive the following courses. (MD/PhD students must meet the minimum requirement of completing 18 hours at Rice and 15 hours of BIOE courses as part of their degree requirements.)
  - BIOC 301 – Biochemistry
  - BIOC 341 – Cell Biology
  - BIOC 344 – Molecular Biology and Genetics
  - NEUR 576 – Neurobiology of Disease
  - BIOC 363 – Endocrinology
  - BIOE 322 – Fundamentals of Systems Physiology
  - NEUR 511 – Integrative Neuroscience Core I
  - NEUR 512 – Integrative Neuroscience Core II
  - PSYC 332 – Abnormal Behavior
- 10) The university minimum requirement for the doctorate degree is 90 semester hours beyond the bachelor's degree (60 hours beyond the master's degree). PhD students must earn the additional credits they need for graduation by registering for the thesis research course, BIOE 500. Students may register for between 1 and 12 credit hours per semester during the terms they are engaged in research.

- 11) Departmental policy requires that full-time students be registered for at least 12 credit hours each semester. If hours are needed in addition to course work, the student should register for research hours (BIOE 500).

**D) Teaching Requirement**

- 1) Teaching is a graduate degree requirement. Each teaching assignment is given a value of 0.5 to 1.0 based on the responsibilities (i.e., some classes may only equal one half of a full TA assignment). After their first semester in residence, students may be asked to spend the equivalent of six to ten hours per week on teaching assignments for a total of 3.0 teaching assignments. Teaching assignments usually involve tutoring, leading recitation sections, grading papers, or supervising work in the undergraduate laboratory.
  - Student will not have any teaching responsibilities during their first semester in residence.
  - Students are encouraged to complete their teaching assignments during the second through fourth semesters. All teaching assignments must be completed prior to submitting a Petition for Approval of Candidacy. Approval of candidacy must be achieved prior to the beginning of the ninth semester in residence.
  - Teaching responsibility may be assigned for a maximum of classes equaling a total of 3.0 teaching assignments. Students planning to pursue an academic career are encouraged to request more involved teaching assignments.
  - At least one teaching assignment must be a lab or design course.
- 2) At the beginning of a teaching assignment, students should meet with the course instructor to discuss expectations and deadlines for the teaching assignment.
- 3) At the end of the semester, there will be an evaluation of the student's performance in their teaching assignment. If a student receives an unsatisfactory rating, that semester will not count towards the maximum three semester assignments.

**E) Selection of Principal Advisor and Thesis Topic**

- 1) The faculty members of the Bioengineering Department will present their research topics to the first-year graduate students during the first month of the semester to allow time for shadowing during the early portion of the fall semester. (Lecture times will be published and provided to students early in the semester and will not conflict with other courses.) Students will choose what labs they wish to shadow.
  - Students must shadow a minimum of two labs and submit verification of this shadowing to the Bioengineering Department.
  - Towards the end of the Advisor Selection Process (on or about October 30) all first year PhD students must submit to the Graduate Academic Affairs committee (GAAC), their three top choices of research projects. These three choices must include topics offered by at least two different faculty members.
  - All PhD students are expected to choose a primary advisor in the Bioengineering Department.

- In addition to receiving the approval of the GAAC, MD/PhD students must receive the approval the Baylor Medical Scientist Training Program of their choice of advisor.
- 2) The selection process is coordinated by the department chair and the Graduate Academic Affairs Committee in an effort to match the wishes and needs of the students to those of the faculty and available funded research projects.

**F) Progress Reports**

- 1) All PhD students are required to submit a semiannual progress report. The progress report should state the student's progress and include, at minimum:
  - List of completed coursework
  - Description of research
  - List of publication or conference presentations by the student
  - Description of work planned for the next 6-month period
- 2) Progress reports must be submitted to the student's advisor and the members of student's thesis committee. A copy signed by the student's advisor must then be submitted to the Department of Bioengineering (Bioengineering Academic Program Administrator).
- 3) The signed copy of the progress report is due on January 31 and July 31 and must be submitted by all PhD students during their entire graduate career beginning with the first year. Submission of progress reports on time is one criteria considered in determining satisfactory performance.

**G) Thesis Proposal**

- 1) PhD students must have completed the following before the beginning of their fifth semester in residence (excluding summers):
  - Selected a thesis committee
  - Prepared a thesis proposal, and
  - Defended this proposal during a meeting of their thesis committee.
- 2) The thesis committee is composed of at least three members:
  - (a) Two members, including the committee chair, must be members of the Bioengineering faculty with their primary appointment in the Bioengineering Department (Adjunct faculty members do not fulfill this requirement.)
  - (b) One member whose primary appointment is in another department within the university.
  - (c) Students must choose a Thesis Director and Committee Chair. The Committee Chair and Thesis Director need not be the same person, however, the Chair, however, must be either a tenured or tenure-track member of the Bioengineering Department or a research faculty member of the Bioengineering Department.

- (d) Additional members of the committee, who may or may not meet the above criteria, may be selected with the approval of the department chair. These members are in addition to the three required members.
- 3) The thesis proposal is a written summary of research progress up to that point and future research plans.
- (a) This document should contain (as a minimum) the following sections:
- Abstract (not to exceed 250 words)
  - Background with extensive literature survey
  - Problem statement
  - Research plans and methodology
  - Any results obtained up to that point, and
  - Proposed time-line for completion of thesis research
- (b) Portions of manuscripts or reports to sponsors (if available) can be incorporated in the thesis proposal.
- (c) The thesis proposal must be distributed to the members of the thesis committee at least one week before the scheduled meeting.
- (d) The meeting should be viewed as an opportunity to assess the student's progress and knowledge of the research field, to assure the student has developed a coherent research plan, and to provide the student with input from the members of the committee in time to incorporate useful suggestions in the thesis research.
- (e) The thesis proposal defense should be documented using the "Thesis Proposal Defense Forms." After the thesis defense is completed, the appropriate forms should be submitted to the Bioengineering Department.
- (f) After the meeting, the thesis advisor should inform the Graduate Academic Affairs Committee of the thesis committee's evaluation of the student's progress and of any recommended action.

#### H) **Internship Opportunity**

In addition to course work, students are encouraged to participate in an optional three- to six-month internship experience. Well received by bioengineering graduate students, the internship program provides an opportunity to gain real-world exposure and/or learn new techniques and tools to apply to their research or gain substantial teaching experience. Students may choose to intern in industry, clinical labs, government national labs, international labs, or teaching institutions. The internship training program for each student is managed through collaborative interaction between the advisor, the host, and the bioengineering program.

#### I) **Satisfactory Progress**

PhD students are expected to make continuous and satisfactory progress towards fulfilling their degree requirements. PhD students will have a yearly evaluation meeting with their

advisor during the first two years of study. They will have yearly evaluation meeting with their Thesis Committee beginning the year their proposal is approved. Students will be provided a written assessment of their academic progress at least annually or more often as deemed appropriate by their advisor or Thesis Committee.

Students who fail to meet any of the requirements for satisfactory progress will receive letters of warning.

1) Satisfactory progress is defined as and includes the following:

- (a) PhD students must have at least 12 semester hours of graduate degree courses (graded using a standard letter grade and excluding course taken on a “pass/fail” or “satisfactory/unsatisfactory” basis) by the end of the first semester in residence.
- (b) After the student’s first semester in residence, students must work on their thesis research on a full-time basis.
- (c) Students must submit their progress reports by the deadlines:
  - Period covering July 1 to December 31: Due January 31
  - Period covering January 1 to June 30: Due July 31
- (d) Students must submit and successfully defend their thesis proposal before the beginning of their fifth semester in residence.
- (e) Students must maintain a GPA of 3.2 or better. Graduate students in the PhD program whose cumulative grade point average for the most recently completed semester (excluding the summer semester) falls below 3.2 are placed on probationary status.
  - Students will be notified in writing of their probationary status. The periods of probation extends to the end of the next semester in which the student is enrolled.
  - Once a student is placed on probationary status they have one semester (excluding summer semester) to improve their grades. If their GPA remains below 3.2 for two consecutive semesters, the student’s stipend will be suspended and the student will become responsible for tuition costs until the student’s cumulative GPA is once again above 3.2. Decisions to reduce or terminate a student’s stipend will be made on a case-by-case basis. The Graduate Academic Affairs Committee, the thesis advisor, and the department chair will consider all the factors that may have affected a student’s performance before reaching such a decision.
  - If the student’s GPA remains below 3.2 for more than two semesters, the advisor has the prerogative to immediately dismiss the student.
  - If the student’s GPA falls below 2.33 for two consecutive semesters (including the summer semester), the student will be immediately dismissed without further warning in accordance with the policy of Graduate and Postdoctoral Studies guidelines for dismissal.

- S/U grades cannot be used to end probationary status.
- Students will be notified of their status once final grades have been received and posted in their records.

J) **Approval of Candidacy and Final Oral Examination**

- 1) Candidacy marks the midpoint in the course of graduate education. Achieving candidacy of the PhD signals that a graduate student has completed required course work and TA assignments, passed the thesis proposal defense to demonstrate his or her comprehensive grasp of the subject area, demonstrated the ability for clear oral and written communication, and shown the ability to carry out scholarly work in his or her subject area.
- 2) Time Boundaries and Deadlines for Petitioning for Candidacy:
  - PhD students must be approved for candidacy before the beginning of the ninth semester of their enrollment at Rice. Students will not be allowed to enroll in a graduate program after their eighth semester unless they have been approved for candidacy.
  - A student's individualized time boundaries are available in Esther. Students who are approaching or who have passed their deadline to candidacy, and who have not met all requirements for candidacy must submit an extension of candidacy request. Extensions are approved on a case-by-case basis by Graduate and Postdoctoral Studies.
  - The Office of Graduate and Postdoctoral Studies will impose a \$125 reinstatement fee on students who are allowed to continue but who have exceeded their time boundaries without prior approval.
- 3) All PhD students must submit a petition for approval of candidacy through the department chair to the Office of Graduate and Postdoctoral Studies. Students must file their applications on or before November 1 for mid-year conferral and on or before March 1 for May conferral. In order to meet departmental deadlines, petitions should be submitted to the department (department coordinator) at least two weeks prior to the deadlines listed above to provide time for processing.
- 4) Students may take the final oral examination in defense of their thesis only after the Dean of Graduate and Postdoctoral Studies approves their candidacy. Final approval of candidacy will come from the Associate Provost and is valid for four years.
- 5) After a student's candidacy has been approved and upon completion of his or her research project, the student must schedule, in coordination with his or her research advisor, a public oral examination of the defense of his or her thesis. Oral examination of the doctoral degree must be announced at least two weeks in advance. Oral examination announcements are to be submitted to the Office of Graduate and Postdoctoral Studies by entering the information into the online Graduate Students Thesis Defense Announcement form at <http://events.rice.edu/rgs>. (Refer to the Graduate and Postdoctoral Studies website: <http://graduate.rice.edu/thesis/> for specific information regarding scheduling requirements. Exceptions to this policy are granted only in rare circumstances.)

- 6) PhD students must defend their thesis before the end of the 16<sup>th</sup> semester of their enrollment at Rice and complete their program within 10 years of initial enrollment in the degree program. A student who does not meet these deadlines will be dropped from Rice.
- 7) All degree candidates are also required to apply for their degree with the Office of the Registrar.

**K) Acceptance of Thesis**

- 1) The completed thesis must be submitted in either final or advanced draft form to the members of the thesis committee at least two weeks before the oral examination. In the course of the examination, the thesis committee members may recommend revisions or additions, which must be incorporated in the final thesis, which is then signed by all committee members.
  - A copy of the completed thesis must also be submitted to the department at least two weeks before the oral examination. This copy may be submitted electronically.
- 2) No later than six months from the date of the examination, candidates who successfully passed the oral examination in defense of their thesis must submit their thesis to the Office of Graduate and Postdoctoral Studies. (Refer to the Graduate and Postdoctoral Studies website <http://graduate.rice.edu/thesis/> for specific instructions regarding how to submit the thesis.) Final approval of the thesis is by the Associate Provost.
  - If the thesis is not ready for final signatures by the end of the six-month period, the “pass” may be revoked and an additional oral defense will need to be scheduled. Application for an extension without reexamination must be made by the candidate with the unanimous support of the thesis committee, endorsed by the school dean, and approved by the Office of Graduate and Postdoctoral Studies. Extensions of this six-month period for completion without reexamination will be granted only in rare circumstances.

## **II) The Master of Bioengineering (MBE) Degree**

The MBE is a non-thesis degree that provides students with greater depth in their bioengineering training to advance their career objectives.

**A) Prerequisites:**

- 1) The following courses are required prerequisites. If a student does not have evidence on his or her undergraduate transcript that they have received credit for the following courses, the student must take them as part of the MBE program:
  - Fundamentals of Systems Physiology (BIOE 322 or equivalent—3 credit hrs.)
  - Cell Biology (BIOC 341 or equivalent) (3 credit hrs.)
  - Statistics (3 credit hours)
- 2) Only one prerequisite course may be counted towards the required 30 hours of

bioengineering, engineering, and elective courses. This course must be graduate level and taken for a standard letter grade. Exception: BIOC 341, BIOE 322 or a 400 level or above statistics course may be taken (for a standard letter grade) as a prerequisite and counted towards the 30 required hours.

- 3) If more than one prerequisite is required, additional courses, other than BIOE courses, may be taken for a standard letter grade or pass/fail credit; however, these courses will not count toward the required 30 credit hours regardless of the grade mode. Per University policy graduate students may not take a course offered by their home department on a pass/fail basis.

#### B) **Requirements**

- 1) Requirements for the MBE degree include the successful completion of 30 semester hours of upper –level courses (300 level or higher including at least 15 BIOE hours at the graduate level) with at least 24 of the thirty hours taken at Rice University.
- 2) Students may petition the MBE Program Committee to allow graduate level courses taken at a different institution (either as an undergraduate or graduate student) to be counted toward their degree. The maximum number of hours which can be transferred from an outside institution is limited to six (6) in order to comply with the university requirement that 24 credit hours be taken at Rice. The courses must be chosen from those that normally satisfy requirements for the advanced degree. No course can be used to satisfy both an undergraduate and graduate degree requirement.
- 3) Students who completed their undergraduate degree at Rice may petition the MBE Program Committee to allow up to 21 credit hours of graduate level courses taken as an undergraduate, which were not used to satisfy undergraduate degree requirements, to count toward their graduate degree. The courses must be chosen from those that normally satisfy requirements for the advanced degree. No course can be used to satisfy both an undergraduate and a graduate degree requirement.
- 4) Students may enroll as full-time or part-time students. Full time students must register for at least nine (9) hours. Part time student must obtain departmental permission and must register for at least three hours in a semester. All time-to-degree requirements apply to part-time students.
- 5) Minimum residence for all master’s degrees is one semester of full-time study.

#### C) **Curriculum:**

- 1) Complete 30 hours of courses including:
  - Fifteen (15) Bioengineering graduate level credit hours. (Refer to Appendix II for a list of graduate level bioengineering courses.)
  - Six (6) credit hours of additional upper level (300 level and above) engineering courses (must be School of Engineering but not necessarily Bioengineering) approved by the MBE Program Committee.
  - Six (6) credit hours of approved upper level (300 level and above) electives (may be outside the School of Engineering, but must be relevant to the

degree and approved by the MBE Program Committee in advance)

- Three (3) credit hours of 400 level or higher mathematics (MATH), statistics (STAT), or computational and applied mathematics (CAAM). Exception: Introduction to Partial Differential Equations (Math 381) or Complex Analysis (Math 382) may be taken to fulfill this requirement and may count toward the 30 required hours.
- 2) To be counted towards the 30 hours required for the MBE degree, all BIOE courses must be at the graduate level (refer to Appendix II). The required MATH, CAAM, or STATS course must be at the 400 level or higher. Engineering and general electives may be upper level (300 or above). All courses used to meet this requirement must be taken for a standard letter grade.
  - 3) MBE students may take BIOE 506 (Graduate Independent Study) for a maximum of 3 credit hours towards their MBE degree. It is the student's responsibility to locate a faculty member willing to mentor them in the Independent Study course. This course must be taken for a standard letter grade.
  - 4) The following courses may not be counted towards the 30 credit hours required for the MBE degree because these courses are graded as "satisfactory/Unsatisfactory:"
    - BIOE 500 – Graduate Research
    - BIOE 501 – Graduate Research
    - BIOE 698 & BIOE 699 – Graduate Seminar (or similar courses in other departments)

**D) Satisfactory Progress**

- 1) MBE students must maintain a GPA of 3.0 or higher.
- 2) Students will be provided a written assessment of their academic progress at the end of each semester.
- 3) Courses in which the student receives a grade below a B- (2.67) may not be used to fulfill the coursework requirement.
- 4) All coursework must be upper-level (300 or above) with at least 15 BIOE graduate level credit hours.
- 5) Graduate students in the MBE program whose cumulative grade point average or the grade point average for the most recently completed semester (including the summer semester) falls below 3.0 are placed on probationary status. The department will notify students in writing of their probationary status.
  - The period of probation extends to the end of the next semester in which the student is enrolled. Once students are placed on probationary status, they have one semester to improve their grades. If the next semester again results in probationary status, (cumulative GPA less than 3.0 or two consecutive semesters below 3.0) the student will be dismissed from the program without further notice.

- Students will be notified of their dismissal once final grades have been received and posted to their records.

### **III) Joint Master of Business/Master of Bioengineering (MBA/MBE)**

The Jesse H. Jones Graduate School of Management and the Department of Bioengineering offer a joint M.B.A./M.B.E. degree program. Curriculum must be approved by the MBE Program Committee and the Department of Bioengineering. This is done on a case-by-case basis and includes:

A) **Prerequisite Courses:** Upon admission to the MBE program, there must be evidence on the student's undergraduate transcript that they have received credit for the following courses.

- Fundamentals of Systems Physiology (BIOE 322 or equivalent—3 credit hrs.)
- Cell Biology (BIOC 341 or equivalent – 3 credit hrs.)
- Statistics

- 1) Only one prerequisite course may be counted towards the required 24 hours of bioengineering, engineering, and elective courses. This course must be a graduate level or higher course and taken for a standard letter grade. (Exception: BIOC 341, BIOE 322, or a 400 level or above statistics course may be taken (with a standard letter grade) as a prerequisite and counted towards the 24 required hours.)
- 2) If more than one prerequisite is required, additional courses, other than BIOE courses, may be taken for a standard letter grade or pass/fail credit, however, these courses will not count toward the required 24 credit hours regardless of the grade mode. Per University policy, graduate students may not take courses offered by their home department on a pass/fail basis.

B) **Requirements/Curriculum**

- 1) Complete a total of 63 credit hours (39 toward the MBA; 24 toward the MBE) including:
- 2) All coursework must be upper-level or above.
- 3) At least 15 of the 24 credit hours of the MBE portion must include:
  - Four (4) Bioengineering electives (12 credit hours) at the graduate level or above (Refer to Appendix II.)
  - Three (3) credit hours of a 400 level or higher mathematics (MATH), statistics (STAT) or computational and applied mathematics (CAAM) course. Exception: Math 381 (Introduction to Partial Differential Equations) or Math 382 (Complex Analysis) may be used to meet this requirement.
  - One (1) additional engineering upper level (300 or above) courses approved by the MBE Program Committee (3 credit hours)
  - Two (2) additional upper level (300 or above) electives approved by the

MBE Program Committee. (6 credit hours). (These electives may be engineering or Bioengineering courses).

C) **Satisfactory Progress**

- 1) Maintain an average GPA of 3.0 or higher. Courses in which a student receives a grade below a B- (2.67) may not be used to fulfill the coursework requirement. Students will be provided a written assessment of their academic progress at the end of each semester.
- 2) Graduate students in the MBA/MBE program whose cumulative grade point average or the grade point average for the most recently completed semester (including the summer semester) falls below 3.0 are placed on probationary status. The department will notify students in writing of their probationary status.
  - The period of probation extends to the end of the next semester in which the student is enrolled. Once students are placed on probationary status, they have one semester to improve their grades. If the next semester again results in probationary status, (cumulative GPA less than 3.0 or two consecutive semesters below 3.0) the student will be dismissed from the program without further notice.
  - Students will be notified of their dismissal once final grades have been received and posted to their records.

## **IV) The Master of Science (MS) Degree**

Few students interested solely in the M.S. degree are admitted and only under special circumstances. M.S. students must satisfy the departmental and university course requirements, fulfill the teaching requirement, complete a research project, write a thesis and successfully defend their work in a public oral examination.

A) **Prerequisite Courses:** The following courses are required prerequisites. If a student does not have evidence on their undergraduate transcript that they have received credits for these courses, they must take them as part of the MS curriculum.

- Fundamentals of Systems Physiology (BIOE 322 or equivalent; 3 credit hours)
  - Cell Biology (BIOC 341 or equivalent; 3 credit hours)
  - Statistics (3 credit hours)
- 1) Only one prerequisite course may be counted towards the 30 credit hours of foundation, supporting, and advanced topic courses required for the MS degree. This course must be a graduate level course and taken for a standard letter grade. (Exceptions: BIOC 341, BIOE 322, or a 400 level or above statistics course may be taken with a standard letter grade to meet prerequisite requirements and counted toward the 30 required hours.)
  - 2) If more than one prerequisite is required, additional courses, other than BIOE courses, may be taken for a standard letter grade or pass/fail credit, however, these courses will not count toward the required 30 credit hours of foundation, supporting,

or advanced topic courses regardless of the grade mode. (University policy does not allow a student to take a course offered by their home department on a pass/fail basis.)

## B) Course Requirements

- 1) MS Students must complete at least 30 semester hours of study (including thesis hours), 24 hours of which must be taken at Rice.
- 2) A grade point average of 3.0 must be maintained at all times.
- 3) Foundation Courses: MS students must take at least 18 semester hours of foundation and advanced courses. Courses used to meet this requirement must be taken for a standard letter grade. The following foundation courses are required of all MS students:
  - Principles of Bioengineering I (BIOE 561; 3 credit hours)\*
  - Principles of Bioengineering II (BIOE 562; 3 credit hours)\*
    - \* BIOE 561 and BIOE 562 should be taken consecutively during the first two semesters of graduate study.
  - Training in the Responsible Conduct of Research (UNIV 594; 1 credit hour)
  - Life Sciences Entrepreneurship (BIOE 633; 1.5 credit hours) or Professional Development for Bioengineering (BIOE 590; 1.5 credit hours)
  - 400 level or higher mathematics (MATH), statistics (STAT) or computational and applied mathematics (CAAM) course (3 credit hours). Introduction to Partial Differential Equations (Math 381) may be used to meet this requirement.
- 4) Advanced Topic Courses
  - A large array of advanced specialty courses is available to BIOE graduate students. Each student should select the courses most appropriate for his or her research work with the help of the thesis advisor and the Graduate Academic Affairs Committee.
  - Advanced topic courses may be used to meet the minimum of 18 credit hours of graduate level courses.
  - Advanced topic courses must be graduate level and graded using a standard letter grade (courses graded as “pass/fail” or “satisfactory/unsatisfactory” cannot be used to meet this requirement.)
  - All courses must be in the relevant field.
- 5) The university minimum credit requirement for the M.S. degree is 30 semester hours. M.S. students must earn the additional credits they need for graduation by registering

for the master's research courses BIOE 500 during the terms they are engaged in research.

- 6) Departmental policy requires that full-time students be registered for at least 12 credit hours each semester.

C) **Teaching Requirement**

All M.S. students must fulfill the teaching requirement as described in under *Teaching Requirement* for Ph.D. candidates unless the student receives no departmental support during the M.S. study. If the student receives no departmental support the student does not need to fulfill a teaching requirement.

D) **Satisfactory Progress**

MS students are expected to make continuous and satisfactory progress towards fulfilling their degree requirements. MS students will have a yearly evaluation meeting with their advisor during the first two years of study. They will have yearly evaluation meeting with their Thesis Committee beginning the year their proposal is approved. Students will be provided a written assessment of their academic progress at least annually or more often as deemed appropriate by their advisor or Thesis Committee.

Students who fail to meet any of the requirements for satisfactory progress will receive letters of warning.

- 1) Satisfactory progress is defined as and includes the following:
- 2) MS students must have at least 12 semester hours of graduate degree courses (graded using a standard letter grade and excluding course taken on a "pass/fail" or "satisfactory/unsatisfactory" basis) by the end of the first semester in residence.
- 3) After the student's first semester in residence, students must work on their thesis research on a full-time basis.
- 4) Students must submit their progress reports by the deadlines:
  - Period covering July 1 to December 31: Due January 31
  - Period covering January 1 to June 30: Due July 31)
- 5) Students must maintain a GPA of 3.0 or better.
  - Graduate students in the MS program whose cumulative grade point average for the most recently completed semester (excluding the summer semester) falls below 3.0 are placed on probationary status.
  - Students will be notified in writing of their probationary status. The periods of probation extends to the end of the next semester in which the student is enrolled (excluding summer semester).
  - Once a student is placed on probationary status they have one semester (excluding summer semester) to improve their grades. If their GPA remains below 3.0 for two consecutive semesters, the student's stipend will be suspended and the student will become responsible for tuition costs until the student's cumulative GPA is once again above 3.0. Decisions to reduce or terminate a

student's stipend will be made on a case-by-case basis. The Graduate Academic Affairs Committee, the thesis advisor, and the department chair will consider all the factors that may have affected a student's performance before reaching such a decision.

- If the student's GPA remains below 3.0 for more than two semesters, the advisor has the prerogative to immediately dismiss the student.
- If the student's GPA falls below 2.33 for two consecutive semesters (including the summer semester), the student will be immediately dismissed without further warning in accordance with the policy of Graduate and Postdoctoral Studies guidelines for dismissal.
- Students will be notified of their status once final grades have been received and posted in their records.
- S/U grades cannot be used to end probationary status.

#### E) **Thesis Requirements**

- 1) M.S. students should select a thesis advisor and research topic according to the same procedure outlined in *Section I.: Selection of Principal Advisor and Thesis Topic*, for Ph.D. candidates. Each student must complete a research project, write a thesis and successfully defend his/her work in a public oral examination.
- 2) The thesis committee is composed of at least three members:
  - Two members, including the committee chair, must be members of the Bioengineering faculty with their primary appointment in the Bioengineering Department (Adjunct faculty members do not fulfill this requirement.)
  - One member whose primary appointment is in another department within the university.
  - Students must choose a Thesis Director and Committee Chair. The Committee Chair and Thesis Director need not be the same person, however, the Chair must be either a tenured or tenure-track member of the Bioengineering Department or a research faculty member of the Bioengineering Department.
  - Additional members of the committee, who may or may not meet the above criteria, may be selected with the approval of the department chair. These members are in addition to the three required members.

#### F) **Approval of Candidacy and Final Oral Examination**

- 1) Candidacy marks the midpoint in the course of graduate education. Achieving candidacy of the MS signals that a graduate student has completed required course work and TA assignments, demonstrated the ability for clear oral and written communicational and shown the ability to carry out scholarly work in his or her subject area.
- 2) Time Boundaries and Deadlines for petitioning for Candidacy:
  - MS students must be approved for candidacy before the beginning of the fifth semester of their enrollment at Rice. Students will not be allowed to enroll in a

graduate program after their fourth semester unless they have been approved for candidacy.

- A student's individualized time boundaries are available in Esther. Students who are approaching candidacy or who have passed their deadline to candidacy and who have not met all requirements for candidacy by the beginning of the fifth semester of their enrollment, must request for an extension of candidacy. Extensions are approved on a case-by-case basis by Graduate and Postdoctoral Studies.
  - The Office of Graduate and Postdoctoral Studies will impose a \$125 reinstatement fee on students who are allowed to continue but who have exceeded their time boundaries without prior approval.
- 3) All MS students must submit a petition for approval of candidacy through the department chair to the Office of Graduate and Postdoctoral Studies. Students must file their applications before November 1 for December conferral and on or before February 1 for May conferral. In order to meet departmental deadlines, petitions should be submitted to the department via the Academic Program Administrator at least one week prior to the deadlines listed above.
  - 4) Students may take the final oral examination in defense of their thesis only after the dean of Graduate and Postdoctoral Studies approves their candidacy. Final approval of candidacy will come from the Associate Provost and is valid for two years.
  - 5) After a student's candidacy has been approved and upon completion of his or her research project, the student must schedule, in coordination with his or her research advisor, a public oral examination of the defense of his or her thesis. Oral examination of the master's degree must be announced at least one week in advance. Oral examination announcements are to be submitted to the Office of Graduate and Postdoctoral Studies by entering the information into the Graduate Students Thesis Defense Announcement form at <http://events.rice.edu/rgs>. (Refer to the Graduate and Postdoctoral Studies website: <http://graduate.rice.edu/thesis/> for specific information regarding scheduling requirements.) The thesis must be given to the committee members one week before the thesis defense.
  - 6) A copy must also be provided to the department (department coordinator) at least one week before the thesis defense. This copy may be submitted electronically.
  - 7) All degree candidates are also required to apply for their degree with the Office of the Registrar.
  - 8) Master's students must defend their thesis before the end of the eighth semester of their enrollment and complete the program within five years of initial enrollment. A student who does not meet these deadlines will be dropped from Rice.

## V) Petitions

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Graduate Students may petition the appropriate academic committee\* for exceptions to academic requirements (course substitutions, waivers, etc.) No specific format is required; however, the petition should include the student's name, the requirement that is the subject to the petition, the

specific exception requested, and the grounds for the request, along with any applicable documentation to support the request. (It is strongly recommended that students obtain the support of their advisor and submit documentation of this support as part of their petition.)

\*PhD and MS students should address petitions to the Graduate Academic Affairs Committee (GAAC). MBE students should address petitions to the MBE Program Committee.

Petitions should be submitted to the Academic Program Administrator by the first Monday of the month in order to be included on the agenda for the next scheduled meeting of the relevant academic Committee.

## **VI) Dismissal from Program**

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### **A) PhD & MS Students:**

- 1) Graduate students (PhD and MS) who are not making adequate progress will be warned in writing of the possibility of dismissal from their research group and/or the graduate degree program.
- 2) The Department Chair and the office of Graduate and Postdoctoral Studies will also be notified in writing of the possibility of dismissal from the research group and or graduate degree program.
- 3) The first written notice will make it clear to the student he or she is being placed on a probationary status and is being considered for separation from the research group and possibly the graduate degree program.
- 4) Students will be given clear expectations of what must be done within a specified time period of not less than three weeks to alleviate the deficiencies or problems resulting in the dismissal consideration.
- 5) A student is encouraged to seek another advisor during this time period in order to provide an option should corrective action not be successful and the student is dismissed from their current research group at the end of the probationary period.
- 6) The student will be reevaluated at the end of the first specified time period. The advisor may determine
  - Adequate progress has been made toward correcting deficiencies and the student is no longer being considered for dismissal. In this case the student will be notified of this decision.
  - Inadequate progress has been made toward correcting deficiencies. In this case, the student will be given a second written notification and additional time of not less than three weeks, to attempt positive progress. The possibility of dismissal must be clearly stated in this warning.
  - If after two written warnings and the passage of the specified probationary period of not less than six weeks, the student has not made sufficient progress toward correcting deficiencies and/or meeting the advisor's expectations, and the advisor is convinced that the student will be unable to achieve adequate progress despite

intervention or additional time, the advisor may dismiss the student from their research group.

- The date of dismissal may correspond with the end date of the last probationary period or any date thereafter. The student will be notified in writing of the decision to dismiss them from the research group. The official date of dismissal must be included in this notification and the student must be advised that financial support will be ending as of this date.

7) Opportunity to Join a Different Research Group

- A student, having been given an opportunity to find another advisor during the probationary period, may change advisors if they are accepted into another research group.
- A student dismissed due to inadequate progress may not change advisors more than twice. Students may not have a total of more than three advisors, including their initial advisor.
- If a student is unable to find another advisor, the student will be dismissed from the graduate degree program.

8) Dismissal normally coincides with the end of a semester. A dismissal from the graduate degree program that takes effect during the semester will be approved by the Dean of Graduate and Postdoctoral Studies in accordance with the Guidelines for Dismissal, Petitions, Appeals, Grievances, and Problem Resolution

9) In cases of egregious failure to maintain satisfactory progress a student's fellowship may be terminated. Decisions to reduce or terminate a student's stipend will be made on a case-by-case basis. The Graduate Academic Affairs Committee, the thesis advisor, and the department chair will consider all the factors that may have affected a student's performance before reaching such a decision.

**B) Professional Masters (MBE) Students**

- 1) Graduate students in the MBE program may be dismissed from the program if either their cumulative GPA or semester GPA falls below 3.0 for two consecutive semesters. Final decision will be made by the MBE Program Committee in consultation with the Department Chair.
- 2) If the student's GPA falls below 2.33 for two consecutive semesters (including the summer semester), the student will be immediately dismissed without further warning in accordance with University policy
- 3) Students will be notified of their dismissal once final grades have been received and posted to their records.

## **VII) Appeals, Grievances, and Problem Resolution**

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Appeals, grievances, and problem resolution are determined in accordance with the *Guidelines for Dismissal, Petitions, Appeals, Grievances, and Problem Resolution* found at <http://graduate.rice.edu/dismissals/>.

## VIII) Financial Support

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- A) Students who receive a stipend in support of their graduate work are expected to devote full-time to their studies and are not to take outside employment. Full-time for first-year students during their first semester of study is considered to consist of four or more (12 credit hours) advanced courses.
- B) Support Limitation Rule – Additional Progress Report
- 1) The normal limit of financial support for graduate students is ten semesters (excluding summers). Students who anticipate taking longer than 10 semesters for completion of the Ph.D. degree, must submit an additional progress report. This report need not be lengthy but should (a) summarize work accomplished since the presentation of the thesis proposal, (b) provide specific information on research work remaining to be done and (c) indicate the estimated time for completion. Manuscripts, reports and even chapters of the thesis already written can be included.
  - 2) The complete progress report should be submitted to the thesis committee no later than one month before the end of the tenth semester in residence. The thesis committee shall consider the report, the recommendation of the thesis advisor, and take into consideration the availability of funds and then convey to the Graduate Academic Affairs Committee its evaluation of the student's progress. This evaluation should contain a recommendation on whether the student's support should be terminated after ten semesters or whether exceptional circumstances exist which justify continued funding. In the latter case, a specific period for continued support, not to exceed one year in duration, shall be included in the recommendation.
  - 3) The graduate studies committee will review the thesis committee's recommendation and, in conjunction with the thesis advisor and the department chair, make a decision.
- C) Vacation Time: During the first semester of study graduate students observe the same holiday schedule as other students engaged in course work. Beginning in the second semester, students engaged in research receive two weeks paid vacation annually, in addition to designated staff holidays, including winter break when the university is officially closed (Students do not automatically receive spring break as time off since the university is not officially closed during this time. Specific time off during spring break should be determined in consultation with the student's advisor). Vacation time must be approved by the student's advisor in advance.
- D) Nonscheduled Absences: Active participation in required academic activities including laboratory work is a basic condition of financial support. Absences other than medical and family emergencies, must be approved by the student's advisor in advance. In the case of medical or family emergencies, notification is expected in as timely a manner as possible depending upon the specific situation.
- 1) Students who are absent from required academic activities for a contiguous two weeks without permission and without mitigating circumstances may be judged to be not making adequate academic progress and are subject to termination of financial support.
  - 2) Students who are not present and carrying out required academic activities for more than one week, without approval of the absence, will receive an immediate written warning.

## **IX) Other Regulations**

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### **A) Continuous Enrollment**

All graduate students are expected to maintain continuous enrollment, unless official leave of absence has been granted. Failure to register for any period without a leave of absence granted by the Associate Provost constitutes *de facto* withdrawal. If a student later wishes to resume study, reapplication is required. Readmission is given only on the recommendation of the department and the approval of the Associate Provost.

### **B) Leave of Absences**

Leave of absence (LOA) is granted only by the Graduate Office upon the recommendation of the department, and is granted only to students in good standing. Leave must be approved in advance of the academic semester in question; it will not be granted after the student has registered for courses or after the registration period has passed. Normally, leave of absence is granted for no more than two consecutive semesters. No work toward a degree may be done at Rice (or involve Rice faculty/facilities) during a student's leave of absence.

### **C) Transfer Between Bioengineering Programs**

- 1) **PhD to MBE:** Admission into a professional program is granted separately from admission into a research or thesis program. Students who wish to change from a thesis program to a professional degree program must petition the department via the Graduate Academic Affairs Committee in writing. Upon recommendation of the department and approval by the dean's office, the request is sent to the Office of Graduate and Postdoctoral Studies for consideration and final approval. If approved, students who received tuition waivers while enrolled in the thesis program will be expected to repay tuition before their professional degrees are awarded. Professional degree programs terminate when the degree is awarded. Students who wish to continue graduate study after completing a professional program must reapply to admission into a research program.
- 2) **MBE to PhD:** Admission to the MBE program is granted separately from admission into a research or thesis (PhD) program. Admission to the MBE program does not guarantee admission to the PhD program. A student working towards an MBE degree and anticipating graduation prior to the semester in which they would begin the PhD program may apply, however, their application will be evaluated using the same criteria applied to all other PhD applicants.
- 3) **PhD to Master's (Thesis Based):** Requests to change from a PhD to a Master's thesis program are only granted under special circumstances. Students who wish to change from a PhD to a Master's thesis program must petition the department in writing. Each request is considered on a case-by-case basis and must receive the approval of the student's advisor and the Chair of the Department.

### **D) Inter-Institutional Courses**

- 1) Under certain circumstances, inter-institutional courses may be taken at participating institutions including, Baylor College of Medicine, The University of Texas Health Science Center At Houston, the University of Texas Medical Branch at Galveston,

and the University of Houston Transfer credit is applied to the student's Rice transcript upon completion of the course due to the fact that courses taken through the inter-institutional program have no equivalent at Rice University. These transfer credits are not counted toward the maximum allowed transfer credits for the student's program (PhD: 12, MS and MBE: 6). In order to qualify for an inter-institutional course, **all** the following criteria must be met.

- Students must be registered **full-time at Rice** during the semester the inter-institutional course is taken. (Note: It is especially important that MBE students who wish to take inter-institutional courses do so during the fall and spring semesters only, when they are normally registered full-time at Rice. Inter-institutional courses will not be approved unless the student is registered full time at Rice during the semester they take the inter-institutional course.)
- Requested class must not be offered by Rice during the term taken.
- Requested class must be necessary for the completion of the graduate degree.
- Number of credits allowed per term/semester may vary depending on the policy of the host school.
- All approval signatures must be completed.
- Note: Foreign students taking inter-institutional courses must check with OISS regarding additional paperwork. Most host schools will require a copy of I-20/DS02019, visa stamp, passport ID page, and I-94.

## Appendix 1- Suggested Time Line for PhD Students

First year, Fall Semester	<ul style="list-style-type: none"> <li>• Register for at least three graduate courses in addition to the following:</li> <li>• Register for Fundamentals of Bioengineering, Part 1 (BIOE 561),</li> <li>• Register for The Graduate Seminar course (BIOE 698),</li> <li>• Register for Ethics in Research Course (UNIV 594).</li> <li>• November of first semester – Deadline for submission of choice of advisor (top three choices ranked)</li> </ul>
First year, Spring Semester	<ul style="list-style-type: none"> <li>• Begin Teaching Assistantships at beginning of second semester.</li> <li>• Register for Fundamentals of Bioengineering, Part II (BIOE 562)</li> <li>• Register for The Graduate Seminar course (BIOE 699)</li> </ul>
Second year, Fall Semester - Summer	<ul style="list-style-type: none"> <li>• Select Thesis committee for thesis proposal exam</li> <li>• Thesis Proposal – Must be completed by the beginning of the 5<sup>th</sup> semester</li> <li>• Register for The Graduate Seminar course (BIOE 698)</li> </ul>
Second year , Spring Semester	<ul style="list-style-type: none"> <li>• Register for The Graduate Seminar course (BIOE 699)</li> </ul>
Third Year	<ul style="list-style-type: none"> <li>• Register for The Graduate Seminar course (Fall: BIOE 698, Spring: BIOE 699)</li> <li>• Teaching Assistantships completed</li> </ul>
Fourth - Fifth year	<ul style="list-style-type: none"> <li>• Prepare Thesis</li> <li>• Defend/present Ph.D. thesis to committee (members of the thesis committee must receive the dissertation two weeks in advance of defense.)</li> </ul>

Year 1			Year 2			Year 3			Year 4			Year 5		
Fall	Spring	Summer	Fall	Spring	Summer	Fall	Spring	Summer	Fall	Spring	Summer	Fall	Spring	Summer
<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 10%; background-color: #cccccc; padding: 5px; font-size: 8px;">                     Advisor Selection Process By end of Nov 1                 </div> <div style="width: 80%; text-align: center;"> <div style="background-color: #cccccc; padding: 10px; margin-bottom: 20px;"> <b>Thesis Proposal</b> </div> <div style="background-color: #cccccc; padding: 10px; margin-bottom: 20px;"> <b>Teaching</b>                      Must complete three teaching assistantships                 </div> <div style="background-color: #cccccc; padding: 10px; margin-bottom: 20px;"> <b>Research</b> </div> <div style="background-color: #cccccc; padding: 10px; margin-bottom: 20px; width: 50%; float: right;"> <b>Thesis Defense</b>                      Usually between 4<sup>th</sup> and 5<sup>th</sup> year                 </div> </div> <div style="width: 10%;"></div> </div>														

**Appendix 2 - Classification for 400 Level and Above Courses – Dept. of Bioengineering**

<b>Course</b>	<b>Name</b>	<b>Credits</b>	<b>Level</b>	<b>Grade Mode</b>
BIOE 400	Engineering Undergraduate Research	VARIABLE	UG	Standard
BIOE 401	Undergraduate Research	VARIABLE	UG	Standard
BIOE 402	Summer Undergraduate Research	3	UG	Standard
BIOE 403	Advances in Bionanotechnology	3	Graduate	Standard
BIOE 405	Independent Research/Internship Program	0	UG	Standard
BIOE 408	Synthetic Biology	3	UG; take graduate equivalent (BIOE 508)	Standard
BIOE 410	Clinical Medical Internship	3	UG	Standard
BIOE 415	Clinical Research Internship	3	UG	Standard
BIOE 420	Biosystems Transport and Reaction Processes	3	UG	Standard
BIOE 422	Gene Therapy	3	UG; take graduate equivalent (BIOE 522)	Standard
BIOE 425	Pharmaceutical Engineering and Drug Delivery	3	UG	Standard
BIOE 431	Biomaterials Engineering	3	UG: take graduate equivalent (BIOE 631)	Standard
BIOE 434	Biofluids	3	UG	Standard
BIOE 440	Statistics for Bioengineers	1	Graduate	Standard
BIOE 442	Tissue Engineering Lab Module	1	UG	Standard
BIOE 443	Bioprocessing Lab Module	1	UG	Standard
BIOE 444	Mechanical Testing Lab Module	1	UG	Standard
BIOE 445	Advanced Instrumentation Lab Module	1	UG	Standard
BIOE 446	Computational Modeling Lab	1	UG	Standard
BIOE 451	Bioengineering Design I	3	UG	Standard
BIOE 452	Bioengineering Design II	3	UG	Standard
BIOE 454	Computational Fluid Mechanics	3	UG; take graduate equivalent (BIOE 554)	Standard
BIOE 455	Systems Biology and Molecular design	3	UG	Standard
BIOE 460	Biochemical Engineering	3	Graduate	Standard
BIOE 464	Extracellular Matrix	3	Graduate	Standard
BIOE 470	From Sequence to Structure: An introduction to Computational Biology	4	UG	Standard
BIOE 481	Computational Neuroscience	3	UG	Standard
BIOE 482	Physiological Control Systems	4	UG	Standard
BIOE 483	Introduction of Biomedical Instrument and Measurement Techniques	3	UG	Standard
BIOE 484	Biophotonics Instrumentation and Applications	3	Graduate	Standard
BIOE 485	Fundamentals of Medical Imaging I	3	Graduate	Standard
BIOE 486	Fundamentals of Medical Imaging II	3	Graduate	Standard

<b>Course</b>	<b>Name</b>	<b>Credits</b>	<b>Level</b>	<b>Grade Mode</b>
BIOE 490	Intro Computational Systems Biology Modeling and Design Principles of brioche Networks	3	UG; take graduate equivalent (BIOE 552)	Standard
BIOE 492	Sensory Neuroengineering	3	UG; take graduate equivalent (BIOE 592)	Standard
BIOE 498	Biomems and Medical Microdevices	3	UG; take graduate equivalent (BIOE 598)	Standard
BIOE 500	Graduate Research	VARIABLE	Graduate	Sat/Unsat.
BIOE 501	Graduate Research	VARIABLE	Graduate	Sat/Unsat.
BIOE 503	Graduate Independent Study	VARIABLE	Graduate	Sat/Unsat.
BIOE 505	Optical Imaging	3	Graduate	Standard
BIOE 506	Graduate Independent Study	VARIABLE	Graduate	Standard
BIOE 507	Systems Biology of Blood Vessels	3	Graduate	Standard
BIOE 508	Synthetic Biology	3	Graduate	Standard
BIOE 512	Optical Imaging and Detection for Bioengineering	3	Graduate	Standard
BIOE 515	Systems Biology and Molecular Design	3	Graduate	Standard
BIOE 520	Biosystems transport Phenomena	3	Graduate	Standard
BIOE 522	Gene Therapy	3	Graduate	Standard
BIOE 540	Introduction to Systems Biology and Systems Biotechnology	3	Graduate	Standard
BIOE 542	Macromolecular Systems Bioengineering	3	Graduate	Standard
BIOE 552	Introductory computational System Biology: Modeling and Design Principles of Biochem Networks	3	Graduate	Standard
BIOE 554	Computational Fluid Mechanics	3	Graduate	Standard
BIOE 561	Principles of Bioengineering I - Theoretical Principles of Bioengineering I	3	Graduate	Standard
BIOE 562	Principles of Bioengineering II - Technique and Applications	3	Graduate	Standard
BIOE 564	Bioinformatics: Network Analysis	3	Graduate	Standard
BIOE 576	Foundations of Biotechnology	1	Graduate	Standard
BIOE 577	Foundations of Biotechnology	1	Graduate	Standard
BIOE 578	Biotechnology Practicum	1	Graduate	Standard
BIOE 579	Introduction to Functional Magnetic Resonance Imaging	3	Graduate	Standard
BIOE 580	Protein Engineering		Graduate	Standard
BIOE 581	Cardiopulmonary Dynamics	3	Graduate	Standard
BIOE 585	Translational Bioengineering Seminar	1.5	Graduate	Standard
BIOE 587	Optical Imaging and Nanobiophotonics	3	Graduate	Standard
BIOE 589	Computational Molecular Bioengineering/Biophysics	3	Graduate	Standard
BIOE 592	Sensory Neuroengineering	3	Graduate	Standard
<b>Course</b>	<b>Name</b>	<b>Credits</b>	<b>Level</b>	<b>Grade Mode</b>

UNIV 594	Training in the Responsible Conduct of Research	1	Graduate	Sat/Unsat.
BIOE 598	Biomems and medical Microdevices	3	Graduate	Standard
BIOE 610	methods of Molecular simulation	3	Graduate	Standard
BIOE 615	Bioengineering and Cardiac Surgery	3		Standard
BIOE 620	Tissue engineering	3	Graduate	Standard
BIOE 631	Biomaterials Engineering	3	Graduate	Standard
BIOE 633	Life Science Entrepreneurship and the Roles of Founders and Venture Capital on High Tech Startup	1.5	Graduate	Standard
BIOE 643	Cell Mechanics, Mechanotransduction and the Cell Microenvironment	3	Graduate	Standard
BIOE 654	Advanced Computational Mechanics	3	Graduate	Standard
BIOE 661	Oncology for bioengineers: Molecules to Organs	3	Graduate	Standard
BIOE 662	New Techniques for Cancer Diagnosis	1	Graduate	Standard
BIOE 682	Systems Biology of Human Diseases	3	Graduate	Standard
BIOE 684	Advanced Biophotonics	3	Graduate	Standard
BIOE 690	Professional Development for Bioengineers	1.5	Graduate	Standard
BIOE 698	Graduate Seminar	1	Graduate	Sat/Unsat.
BIOE 699	Graduate Seminar	1	Graduate	Sat/Unsat.
BIOE 777	Visiting Research Trainee	0	Graduate	Sat/Unsat.