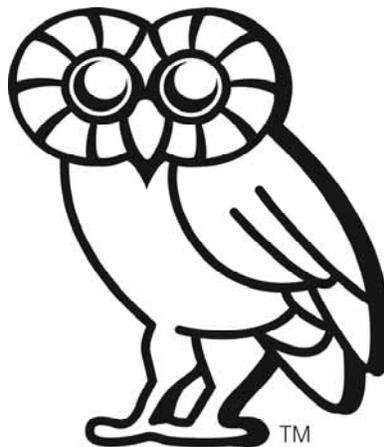


# **DEPARTMENT OF BIOENGINEERING**

## GRADUATE DEGREE REQUIREMENTS AND PROCEDURES STUDENT HANDBOOK



2013

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## PREFACE

The policies outlined in this document pertain to graduate studies in the PhD, MD/PhD, MS, and MBE programs in the Department of Bioengineering. In case of error, omission, or conflict, policies of the Rice *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 following two options.

1. Continue studies under the complete set of policies in place at the time of his or her matriculation into the program, or
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 case, the faculty may apply a new regulation to all students who have not passed a specific milestone (e.g., 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 choices. It is the student's responsibility to be familiar with the rules, procedures, and requirements of the Bioengineering Department, the Office of Graduate and Postdoctoral Studies, and Rice University. It is the ultimate responsibility of the student to make sure that policies and timelines are followed in order to allow for a timely graduation.

### NOTICE:

Students are responsible for meeting all program and university requirements. In addition to being in agreement with the regulations stated in this departmental handbook, students must also be in agreement with the General Announcements (<http://ga.rice.edu/>) and the Code of Conduct (<http://www.students.rice.edu/students/Conduct.asp>). A student failing to meet department or university requirements is subject to dismissal from the program.

In cases where there is conflicting information, university-wide regulations take precedence over department-wide regulations, which take precedence over research group-wide regulations.

When in doubt, students should first seek help at the department level (academic program administrator) and then at the central administration level (Office of Graduate and Postdoctoral Studies).

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## **DEPARTMENT OF BIOENGINEERING ADMINISTRATION**

The faculty body is responsible for establishing and maintaining the academic policies of the department aligned with Rice University guidelines. The Chair is primarily responsible for instituting strategic goals, the vision, and building culture that set the direction of the department and is assisted by the Associate Chairs, while the Executive Director ensures the department's daily activities are executed by department staff and run smoothly.

### **Administrative Staff**

Students have access to administrative staff for assistance. The primary contact person for graduate students is Gayle Schroeder, BIOE Academic Program Administrator (BRC 135F, [ges2@rice.edu](mailto:ges2@rice.edu), phone 713.348.5063).

### **Faculty**

Faculty members have a myriad of responsibilities including the advisement and mentoring of students, research in their areas of interest and expertise, managing the financial aspects of their labs, and instruction at the undergraduate and/or graduate level.

**PhD and MS Students:** The primary faculty contact for PhD and MS students is the student's individual advisor. PhD and MS students may also seek the guidance of the Graduate Academic Affairs Committee (GAAC). This committee is responsible for program development and coordination of activities related to the PhD graduate program, including assessment issues. Specific duties include the consideration of all proposed new courses, curricula modifications, and program activities. Additionally the committee reviews student petitions. The Committee allows student representation through a member of the BIOE Graduate Student Association. Students may petition the GAAC for exceptions to academic requirements (course substitutions, waivers, etc.) Details of how to submit a petition are listed under the "Petitions" section of these guidelines.

**MBE Students:** The primary faculty contact for MBE students is the Chair or another member of the MBE Committee. This committee is responsible for program development and coordination of activities related to the MBE program including assessment issues. Specific duties include the consideration of the proposed new courses, curricula modifications, and program activities. Additionally the committee reviews student petitions for exceptions to academic requirements (course substitutions, waivers, etc.). Details of how to submit a petition is listed under the "Petitions" section of these guidelines. The MBE Committee is responsible for the application review process for MBE applicants and makes recommendations on admission decisions. The Committee allows student representation through a member of the BIOE Graduate Student Association.

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## PREREQUISITE REQUIREMENTS

The following three prerequisites are required for students in all graduate programs of the Department of Bioengineering:

1. Fundamentals of Systems Physiology
2. Cell Biology
3. Statistics

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 program curriculum. The following may be chosen to fulfill these requirements:

Prerequisite	Approved Courses
Fundamentals of Systems Physiology	BIOE 322: Fundamentals of Systems Physiology BIOE 381/ELEC 381: Fundamentals of Nerve and Muscle Electrophysiology ELEC 480: Introduction to Neuroengineering
Cell Biology	BIOC 341
Statistics	BIOE 440 or any 400 level or above statistics course

Only one prerequisite course may be counted towards the credit hours of courses required for the degree.

If the course is to be counted towards the credit hours for the degree requirements, the course must be taken for a standard letter grade.

If more than one prerequisite is required, additional courses, outside of bioengineering courses, may be taken for a standard letter grade or pass/fail credit; however, these courses will not count toward the required credit hours for the degree program 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. All BIOE courses must be taken for a standard letter grade regardless of the reason for taking the course.

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## DOCTOR OF PHILOSOPHY (PhD) DEGREE

The Rice bioengineering program is comprehensive and provides students with a fundamental understanding of the life and medical sciences, advanced analytical and engineering capabilities, and translational research. With this educational background, graduates will be well prepared to participate in independent or collaborative research and development endeavors in industry or academia. Students in the PhD program must enroll on a full-time basis.

Most formal courses should be completed in the first year of residence to allow students to commence thesis research by the end of their second semester. During the first semester, until students are assigned a faculty advisor, students are advised by the Graduate Academic Affairs Committee. The student's advisor will take over the advising role once the student officially joins a lab. The student is responsible for completing the various phases of the graduate program within the prescribed time limitations.

### PhD CURRICULUM

**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.

- 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.)
- A minimum of 15 credit hours of graduate level bioengineering courses must be included in the foundation, supporting, and advanced topics courses. (See Appendix 1 for a list of graduate level bioengineering courses.)
- A minimum of 18 of the 30 required credit hours must be taken at Rice.
- A minimum of 15 credit hours must be at the 500 level or above.
- Students may transfer a maximum of 12 credit hours from a different institution. (See the section "Transfer of Courses" for further information.)

**Foundation Courses:** The following foundation courses are required of all PhD students:

- BIOE 516 – Mechanics, Transport, and Cellular Signaling (3 credits)
- BIOE 517 – Instrumentation and Molecular Analysis (3 credits)
- BIOE 518 – Introduction to Computational Biology (3 credits)
- BIOE 519 – Biomaterials (3 credits)
- UNIV 594 – Training in the Responsible Conduct of Research (1 credit)
- BIOE 633 – Life Sciences Entrepreneurship (1.5 credits)
- 400 level or higher mathematics (MATH), statistics (STAT) or computational and applied mathematics (CAAM) course (3 credits). Exceptions:
  - Introduction to Partial Differential Equations (Math 381) may be taken to fulfill the math requirement
  - Complex Analysis (Math 382) may be taken to fulfill the math requirement.
  - BIOE 439 is meant for undergraduates only and may not be used to meet the math requirement.

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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 in consultant with his or her thesis advisor. Advanced topic courses may be used to meet the minimum of 15 credit hours of graduate level BIOE courses.

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

#### Graduate Seminar Courses (BIOE 698/699)

Students are required to enroll in the graduate seminar courses, BIOE 698 (fall) and BIOE 699 (spring) each semester of their first three years of study for a total of six (6) credit hours. Seminars will be given by leaders from the field of bioengineering. In general, there will be a time scheduled for graduate students to meet with the seminar speakers for an informal discussion after the seminar. Attendance at the informal discussion session is not mandatory but is strongly recommended.

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.

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.

Note: Use of laptop computers and electronic tablets are not allowed during the seminar course.

#### Course Requirements

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. At least 15 credit hours must be at the 500 level or above.

All coursework must be at the graduate level except where specifically exempted for a course taken to meet a prerequisite requirement and counted toward the degree requirements (see section regarding “Prerequisites”).

Students must take a minimum of 15 credit hours of graduate level BIOE courses for a standard letter grade. In specific instances, the Graduate Academic Affairs Committee may waive a course. Waived courses will count toward the required 30 credit hours; however, such courses 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.

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Students must earn 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.

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.

During their first semester in residence, all full-time PhD students must take at least three advanced courses (9 credit hours) for a standard letter grade. (Courses taken on a “pass/fail” or “satisfactory/unsatisfactory” basis do not count toward this 9 credit hour requirement). Note: Students 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.

After the first semester, students should register for enough advanced courses so that they meet, at all times, the satisfactory progress requirements outlined in these requirements.

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 and course descriptions to the Graduate Academic Affairs Committee. No course may be used to satisfy both an undergraduate and graduate degree requirement. Such credit will not exceed 12 semester hours and students must still take at least 18 credit hours of advanced courses at Rice to meet university requirements.

The following restrictions also apply:

- Each case must be individually approved by the Graduate Academic Affairs Committee based on the work done.
- A student may not subsequently count toward the PhD requirements a course which is substantially the same as one already completed and counted toward the degree requirements. The decision as to whether a course is “substantially the same” will be made by the Graduate Academic Affairs Committee.

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.

MD/PhD students in the Medical Scientists Training Program may waive the following courses. (MD/PhD students must still 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

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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.

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 BIOE 500, "Graduate Research". Students are expected to fulfill the research requirements as defined by their advisor to earn a "satisfactory" grade in BIOE 500.

### **SELECTION OF PRINCIPAL ADVISOR AND LABORATORY ROTATION**

The key for successful PhD graduates is the relationship with their research advisor. To facilitate learning about various research projects and lab environments, first-year PhD students participate in laboratory rotation. The purpose of lab rotation is to assist the first-year students in choosing an advisor and a lab for conducting thesis research. Rotations should also encourage cohesion within the department and students should use this opportunity to explore research options other than their declared area of interest

Students must register for BIOE 504 "Graduate Lab Rotation" during their first fall semester. BIOE 504 is a three (3) credit hour course. This course gives the student the opportunity to experience different research projects while allowing the faculty to assess the interests and aptitude of the students. This course is graded as "Satisfactory/Unsatisfactory." Unless Students successfully complete a minimum three lab rotations they will not receive satisfactory credit for this be allowed placement with an advisor.

Students may not opt out or waive the rotation requirements except in cases of a student recruited on behalf of a specific faculty member and this arrangement was stipulated in the student's official admission offer letter. Students who were offered and accepted an offer to work directly with a particular research advisor and this offer was noted in their official offer letter will not participate in first-year lab rotation and are exempt from the 504 credit requirement.

Research presentations will take place during orientation and the first few weeks of Graduate Seminar to introduce students to bioengineering research in the department. Students will be provided a list of advisors within the Department of Bioengineering who expect to accept students into their labs. This list will include the maximum number of available positions in each lab. After advisor presentations and opportunity to discuss rotations with possible advisors, students will be asked to choose labs where they wish to complete rotations.

Each student will be asked to rank five advisors. Students are strongly encouraged to discuss lab rotations with potential advisors before they submit their list of rotation requests. Students are expected to choose advisors within the Department of Bioengineering; however, students may rotate outside the Bioengineering Program for a maximum of one rotation. The mentor must be a faculty member whose primary appointment is in a department at Rice University or who holds an adjunct faculty position in the Department of Bioengineering. The Graduate Academic Affairs Committee will assign each student to three rotations from the list. Students will be given a schedule of lab rotation deadlines, including the deadline for submitting the ranked list.

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Students will complete three laboratory rotations of about 3 weeks each, starting in mid-September and ending mid-November. Students shall spend enough time in the lab to understand the research projects and approaches and to interact with lab members and the advisor. Specific dates and rotation requirements will be determined by the advisor. Students will be given a schedule of lab rotation deadlines, including the deadline for completing all lab rotations.

Specific cases where a student and advisor wish to schedule rotations outside of the above time frame will be decided on a case-by-case basis. The Graduate Academic Affairs Committee must be notified of any such rotations.

To facilitate and optimize the rotation experience for both the student and the faculty, it is important that student and advisors meet prior to the start of the rotation to discuss expectations, goals, requirements and laboratory guidelines. It is the student's responsibility to meet with the advisor to discuss what is expected of the student during the rotation period. During this meeting, the advisor should make clear his/her expectations for the rotation. In general, the student should expect to spend approximately nine (9) hours in the lab per week for each rotation.

Although not encouraged, rotations may be carried out concurrently. It is important that students actively engage in the lab during the rotation period. Suggested activities include attending lab meetings, interacting with graduate students and post-docs, and discussing research with the faculty member.

Students are welcome but are not required to discuss research opportunities with other faculty members besides those with whom the student was assigned a rotation. A rotation with another advisor may be approved at the discretion of the advisor. These rotations must be in addition to, not take the place of, the three officially approved rotations. The times and duties of these additional rotations should not conflict with assigned rotations.

As part of the lab rotation grade, students are required to submit a lab rotation assessment form at the end of each rotation. Failure to submit a minimum of three lab rotation assessment forms will result in a grade of "unsatisfactory" and prevent the student from choosing an advisor.

Once the student completes all lab rotations, he/she should submit his/her Advisor Selection Form with a ranked list of desired research projects and advisors. Students must choose a minimum of three projects under the direction of at least two different advisors. (Lab rotation forms should be submitted for each project to assure proper credit is documented.) Students may include laboratories that were not among the three approved rotation labs, however, they should not include an advisor on their ranked list unless he/she has discussed research opportunities with the advisor and, preferably, carried out a rotation in the lab. Students will be given a schedule of lab rotation deadlines, including the deadline for submitting the Advisor Selection form.

The following rules apply:

- All PhD students are expected to choose a primary advisor in the Bioengineering Department.
- If a student chooses a primary advisor who does not hold a primary position in a department at Rice University, they must have a co-advisor within the Department of Bioengineering who is willing to provide financial support should the relationship with the outside advisor end.

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- Students who are approved to have an advisor outside of the Department of Bioengineering are expected to follow all procedures and meet all degree requirements of the Department of Bioengineering. Students with outside advisors should be aware that the advisor may have additional expectations.
  - In addition to receiving the approval of the GAAC, MD/PhD students must receive the approval of the Baylor Medical Scientist Training Program of their choice of advisor and must provide proof of acceptance to the Bioengineering Academic Program Administrator prior to final approval of their Rice advisor.
  - At the present time, students may not choose a primary advisor whose primary appointment is at MD Anderson Cancer Center.

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. Once all students have submitted their Advisor Selection Form and, after consultation with the requested advisors, final approval of the student's advisor is given by the Graduate Academic Affairs Committee.

Several factors are considered during the matching process, including funding, available space, academic standing, rotation performances, and the relationship between the student and the potential advisor.

Most students will be notified of the assignment of his/her advisor before the end of the Fall semester. In special circumstances where a student cannot be placed with an advisor by this deadline, the student will be notified and efforts to assign an advisor will be handled on a case-by-case basis.

## **THESIS PROPOSAL**

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.

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.)
- The third member must be a faculty 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.

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- 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.

The thesis proposal is a written summary of research progress up to that point and future research plans. 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

Portions of manuscripts or reports to sponsors (if available) can be incorporated in the thesis proposal.

The thesis proposal must be distributed to the members of the thesis committee at least one week before the scheduled meeting.

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.

The thesis proposal defense should be documented using the "Thesis Proposal Defense Forms." These forms can be obtained from the BIOE Academic Program Administrator or the Academic Program Staff Assistant in BRC 135F. After the thesis defense is completed, the appropriate forms should be submitted to the BIOE Academic Program Administrator in BRC 135F. After the meeting, the Graduate Academic Affairs Committee will be notified (provided a copy of the thesis proposal defense form summary page) of the thesis committee's evaluation of the student's progress and of any recommended action.

## **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. Once the proposal is approved, the student will have yearly evaluation meeting with his or her thesis committee. 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. The student's signed progress report with any comments from the advisor/thesis committee will serve as this written assessment. A copy of the written assessment will be included in the student's record.

Students who fail to meet any of the requirements for satisfactory progress will receive letters of warning. Satisfactory progress is defined as and includes the following:

- PhD students must have at least nine (9) 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.

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- After the student's first semester in residence, students must work on their thesis research on a full-time basis.
  - Students must submit progress reports by the deadlines noted in the "Progress Reports" section of these guidelines.
  - Students must submit and successfully defend their thesis proposal before the beginning of their fifth semester in residence.
  - Students must petition for candidacy prior to the beginning of their ninth semester.
  - 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 may be suspended and the student may 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.

Satisfactory/Unsatisfactory 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.

## **PROGRESS REPORTS**

All PhD students are required to submit semiannual progress reports during their entire graduate career. Submission of progress reports is one criteria used to determine satisfactory performance.

Progress reports must be submitted to the student's advisor and, once selected, the members of the student's thesis committee. The advisor and committee will take this opportunity to discuss the student's progress with the student and make any recommendations to the student.

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First year student's first report must cover the time frame beginning with the first day of the fall semester in which the student matriculates and ending on December 31. All subsequent reports will be on a calendar year basis and cover the time frames, January to June and July to December. The deadline for the January to June report is July 31<sup>st</sup>. The July to December report is due on January 31<sup>st</sup>.

Students should consult with their advisor to determine if he/she has specific formatting or other requirements. At minimum, the progress report should include the following:

- Student name, student ID number, and Rice email address
- Name of Advisor
- List of coursework completed during reporting period
- List of teaching assignments completed during reporting period
- List of publications or conference presentations by the student during reporting period
- List of awards and accomplishments during reporting period
- Description of research completed during reporting period (research progress and outcomes)
- Description of work planned for next reporting period (courses likely to be taken during next reporting period, research plans and expectations).
- Advisor's approval

Students must submit their progress report to their advisor for review and recommendations. If the student has selected a thesis committee, a copy must also be sent to each thesis committee member. Once the student's advisor has approved the final version, a copy must be forwarded to the Bioengineering Academic Program Administrator ([ges2@rice.edu](mailto:ges2@rice.edu)) by the appropriate deadline. Unsigned copies **will not** be accepted. Students should begin their reports in time to assure time for the advisor to review and approve it prior to the deadline.

## **TEACHING REQUIREMENT**

Teaching is a graduate degree requirement. Students will not have teaching responsibilities during their first semester in residence. After their first semester students may be asked to spend the equivalent of six to ten hours per week on teaching assignments. Teaching assignments may involve tutoring, leading recitation sections, grading papers, or supervising work in the undergraduate laboratory. Each teaching assignment is given a point value of 0.5 to 2.0 based on the course requirements. Students must complete a total point value of three (3.0) teaching assignments.

Students are expected to complete their teaching assignments during the second through fifth semesters.

It is the student's responsibility to complete their teaching assignments prior to submitting a petition for approval of candidacy. (Candidacy must be achieved prior the beginning of the ninth semester in residence.)

At least one teaching assignment must be a lab or design course.

Teaching responsibilities may be assigned for a maximum of classes equaling a total of 3.0 teaching assignments. So that all students may have an opportunity to complete their teaching assignments, students will not be allowed to complete more than 3.0 teaching assignments unless there are unfilled teaching positions, or in special circumstances, approved in advance, by the Graduate

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Academic Affairs Committee. (Requests for exceptions should be sent via email to Gayle Schroeder at ges2@rice.edu.)

Students must serve as teaching assistants for bioengineering classes. Exceptions to this rule may be granted only in special circumstances (e.g., course is cross-listed and has a substantial number of BIOE students enrolled) and each exception must be approved in advance by the Graduate Academic Affairs Committee.

Students planning to pursue an academic career are encouraged to request more involved teaching assignments.

Procedure:

1. Prior to the beginning of each semester the Associate Chair for Undergraduate Affairs, in consultation with the faculty, will determine the number of teaching assistant positions required for the semester based upon class size and course requirements. The Chair of the Bioengineering Department has final approval.
2. Instructors will be asked to provide specific qualifications (i.e. course work, lab training, computer skills, etc.) for their courses. Qualifications will be included on the TA worksheet. Once completed, the TA worksheet, with available positions and qualifications, will be given to the BIOE Graduate Student Association Chair.
3. The BIOE GSA will notify the students of available TA positions. It is the student's responsibility to complete the TA application and submit it to the BIOE GSA. Incomplete applications or applications submitted after the deadline will not be accepted.
4. The BIOE GSA representatives, working closely with the Bioengineering Academic Program Administrator, will review the applications and assign TA positions using a matching process to assure appropriate assignments are made.
5. Once the TA positions have been determined the TA list will be sent to the Associate Chair for Undergraduate Affairs and the Associate Chair for Graduate Affairs for review and approval. This is done prior to sending the TA assignments to the instructors or students.
6. Faculty instructors will be notified of the TA assignments once the matching process is completed and the final TA list is approved. Any revisions by instructors should be completed at least two weeks prior to the beginning of the semester.
7. Once instructors are given an opportunity to review the TA assignments, students will be notified of the course and instructor to which they have been assigned.

The following apply:

- Teaching assistant positions will be filled according to the specific requirements of the course, as defined by the instructor, and the qualifications of the student.
- Students and instructors may not make arrangements outside of the official TA matching process. Instructors may require specific qualifications; however, they may not specify a specific student serve as the TA for their class. (An exception is made for design or lab courses that continue for two semesters and the same student should serve as the TA for

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both semesters. In this case, if the instructor requests, the TA during the first semester will also be reassigned to TA during the second semester.)

- An effort will be made to match students with their primary course choices, however, preference are given to the needs of the instructor; therefore, a preferred course cannot be guaranteed.
- Students are required to teach the course to which they are assigned unless they can prove an unavoidable conflict.
- Students will not be assigned TA courses equaling more than 1.0 teaching assignments during a semester. An exception will be made for BIOE 252. Other exceptions to this rule require advance approval of the Graduate Academic Affairs Committee.
- TA assignments will not be changed once the semester begins except in exceptional circumstances approved by the Graduate Academic Affairs Committee or the Chair of the Department.
- Students may not TA a course in which they are concurrently enrolled.

#### Student Responsibilities:

- TAs should follow an appropriate code of conduct. This includes acting in a trustworthy and responsible manner, treating others with respect, treating students fairly, and limiting your interactions and relations with students in the class to a professional nature while serving as a TA.
- TAs must meet with the course instructor prior the beginning of the teaching assignment to discuss expectations and deadlines.
- It is the TA's responsibility to disclose any possible conflicts of interest to the instructor. This includes, but is not limited to, disclosure of personal relationships with members of the class. When in doubt about a possible conflict of interest, the student TA should discuss the specific situation with the instructor.
- TAs are expected to attend scheduled classes for the course for which they are serving as a TA unless specified otherwise by the instructor.
- The number of hours required for teaching assignments varies depending upon the course. Students should discuss specific requirements with the instructor prior the class beginning. In general, TAs should expect to devote six to ten hours per week, exclusive of hours attending class sessions, on teaching assignments.
- TAs responsibilities vary depending upon the class; TA are expected to fulfill all reasonable requests made by the instructor.
- TAs are expected to work collaboratively with other TAs and graders as necessary.
- The TA's performance will be evaluated at the end of their teaching assignment. If a student receives an unsatisfactory rating, the semester will not count towards the required TA

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assignments. It is the student's responsibility to fully understand the expectations of the instructor.

Note: Official documentation of teaching assignments will be recorded in the student's record and will be made available to the student upon request.

### **INTERNSHIP OPPORTUNITY**

In addition to course work, PhD 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.

Generally, students participating in internships do not receive a graduate student stipend during the time of the internship. Details of financial arrangements should be discussed with the student's advisor and finalized prior to the internship. The BIOE Academic Program Administrator should be notified no less than three weeks prior to the beginning of the internship in order to assure time to make necessary revisions to payroll. If appropriate documentation is not received in time to make adjustments to the student's payroll, the student will be responsible for repaying any overpayment he or she may receive. The student should provide the BIOE Academic Program Administrator documentation (offer letter, evaluation) of the internship so that it may be documented in the student's record.

Decisions regarding stipends from external fellowships during an internship is based upon the requirements of the fellowship/training grant and are made on a case-by-case basis. If a student has received an external fellowship or training grant, it is the student's responsibility to assure that the internship does not conflict with guidelines and requirements of the fellowship or grant.

### **OPPORTUNITY FOR PRESENTATION OF RESEARCH**

Students are encouraged to discuss specific opportunities to present their research with their advisors. The GSA sponsors a Breakfast Club which offers an opportunity for peer reviewed research presentations. The department will provide additional opportunities for poster sessions during the year.

### **APPROVAL OF CANDIDACY AND FINAL ORAL EXAMINATION**

In thesis programs, the attainment of candidacy marks the completion of all requirements for the degree other than those related to research leading to the writing, submission, and defense of the thesis.

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### 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 the Office of 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.

All PhD students must submit a petition for approval of candidacy. Petitions should be submitted to the BIOE Academic Program Administrator (BRC 135F). (Note: Students are not required to submit the three requested attachments; these will be added by the department before forms are submitted for approval.) The candidacy form may be found on the website for the Office of Graduate and Postdoctoral Studies at the following website: <http://graduate.rice.edu>. (specific form can be found at: <http://gpsdocs.rice.edu/forms/DoctoralCandidacyPetitionForm.pdf>).

Students who wish to have their degree conferred in December must file their applications on or before November 1. Students who wish to have their degree conferred in May must submit their applications on or before March 1. In order to meet departmental deadlines, petitions should be submitted to the department (BIOE Academic Program Administrator) at least two weeks prior to the deadlines listed above to provide adequate time for processing.

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.

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. This form can be found at <http://events.rice.edu/rgs>. (Refer to the GPS website: <http://graduate.rice.edu/thesis/> for specific information regarding scheduling requirements. Exceptions to this policy are granted only in rare circumstances and must be approved by GPS.

PhD students must conclude an original investigation that is formalized in an approved thesis. 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. A copy of the final draft or completed thesis must also be submitted to the department at least two weeks before the oral examination. This copy may be submitted electronically to [ges2@rice.edu](mailto:ges2@rice.edu). 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.

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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 dismissed from Rice.

### **ACCEPTANCE OF THESIS**

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. A student's thesis must be submitted electronically. 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 must be scheduled. Extensions of this six-month period for completion without reexamination will be granted only in rare circumstances. 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.

### **GRADUATION**

All degree candidates are also required to apply for their degree with the Office of the Registrar.

### **FINANACIAL SUPPORT**

Students (MS & PhD) 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 three or more (9 credit hours) advanced courses. Financial support is dependent upon satisfactory performance, reasonable progress toward degree requirements, and the availability of funds. Student stipends are subject to all of the usual federal taxes.

#### **Support Limitation Rule – Additional Progress Report**

The Department of Bioengineering will fund students for the first nine months of study. In most cases this covers the period from August 16 to May 15. Advisors become responsible for financially supporting students the first day of the tenth month of study. Advisors are expected to pay 100% of the student's stipend unless that stipend is funded by an external fellowship, scholarship, training grant, or other source of external funding which covers all or a portion of the student's stipend.

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 consult with their advisor. The advisor may require the student to submit an additional progress report providing the following: (a) summarization of work accomplished since the presentation of the thesis proposal, (b) specific information on research work remaining to be done and (c) estimated time to completion.

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The advisor, in consultation with the thesis committee, shall consider the student's progress, exceptional circumstances which justify continued funding, and the availability of funding when making a decision regarding whether the student's funding should be continued for a specific period. Continued support should be reevaluated annually or more often as appropriate.

Students whose funding has been terminated may continue to register and work on research projects as long as they continue to make acceptable progress toward the degree requirements. If a student fails to continue to make acceptable progress he or she is subject to dismissal from the program (See section on "Dismissal from Graduate Program.")

#### External Fellowships/Scholarships

Students are required to notify the Department of Bioengineering of any external fellowships or scholarships they receive immediately upon receiving the award including awards received prior to matriculation.

If a student is awarded a fellowship or scholarship prior to matriculation, the student is encouraged to defer the fellowship/scholarship for one year if this is allowed by the sponsor. In cases where the student defers the fellowship/scholarship, it is usually deferred for a full calendar year. The department will pay the student the current departmental stipend for the first nine months of study. After the initial nine months, the advisor will pay the student's stipend at the current departmental stipend rate until the fellowship/scholarship becomes effective.

If the student does not defer his or her fellowship/scholarship during the first year or if the student receives a fellowship/scholarship after the first nine months, the following will apply:

- If the total amount of the fellowship, including stipend, insurance, etc. is below the current stipend offered by the Department of Bioengineering, the student's fellowship is supplemented to equal the current Rice stipend level and the student is provided an additional \$4000 annual supplemental stipend during the period of the fellowship. These supplements are paid by the department during the first nine months of study. The advisor becomes responsible for the supplemental payments beginning the tenth month of study, or, for students who receive awards after the first nine months, on the date the fellowship/scholarship becomes effective. The fellowship/scholarship must be competitive and designated for the graduate stipend.
- If the total amount of the fellowship, including stipend, insurance, etc. is above the current stipend offered by the Department of Bioengineering, the student is provided an additional \$4000 annual supplemental stipend during the period of the fellowship. This \$4000 annual supplemental stipend is offered regardless of the amount of the stipend provided by the external funding. No additional stipend independent of the amount of the fellowship will be offered. This supplement is paid by the department during the first nine months of study. The advisor becomes responsible for the supplemental payments beginning the tenth month of study, or, for students who receive awards after the first nine months, on the date the fellowship/scholarship becomes effective.

If a student's fellowship/scholarship ends or is revoked during the student's studies at Rice, assuming the student is achieving satisfactory performance, reasonably progressing toward their degree, and funds are available, the student will receive financial support (department stipend and associate tuition waiver) at the level provided by Rice at the time. The student will no longer receive the \$4000 supplemental stipend. The department will pay the stipend during the first nine months of study. The advisor will become responsible beginning the tenth month of study.

Training Grants

If a student is awarded a training grant for an amount below the current level of support offered by the Department of Bioengineering, the student's grant is supplemented to equal the current stipend level. No additional stipend independent of the amount of the grant will be offered. This supplement is paid by the department during the first nine months of study. The advisor becomes responsible at the beginning of the tenth month of study, or, for students who receive training grants after the first nine months, on the date the training grant becomes effective.

If a student's training grant ends or is revoked during the student's studies at Rice, assuming the student is achieving satisfactory performance, reasonably progressing toward their degree, and funds are available, the student will receive financial support (department stipend and associate tuition waiver) at the level provided by Rice at the time. The department will pay the stipend if the student is in the first nine months of study; the advisor is responsible beginning the first day of the tenth month of study.

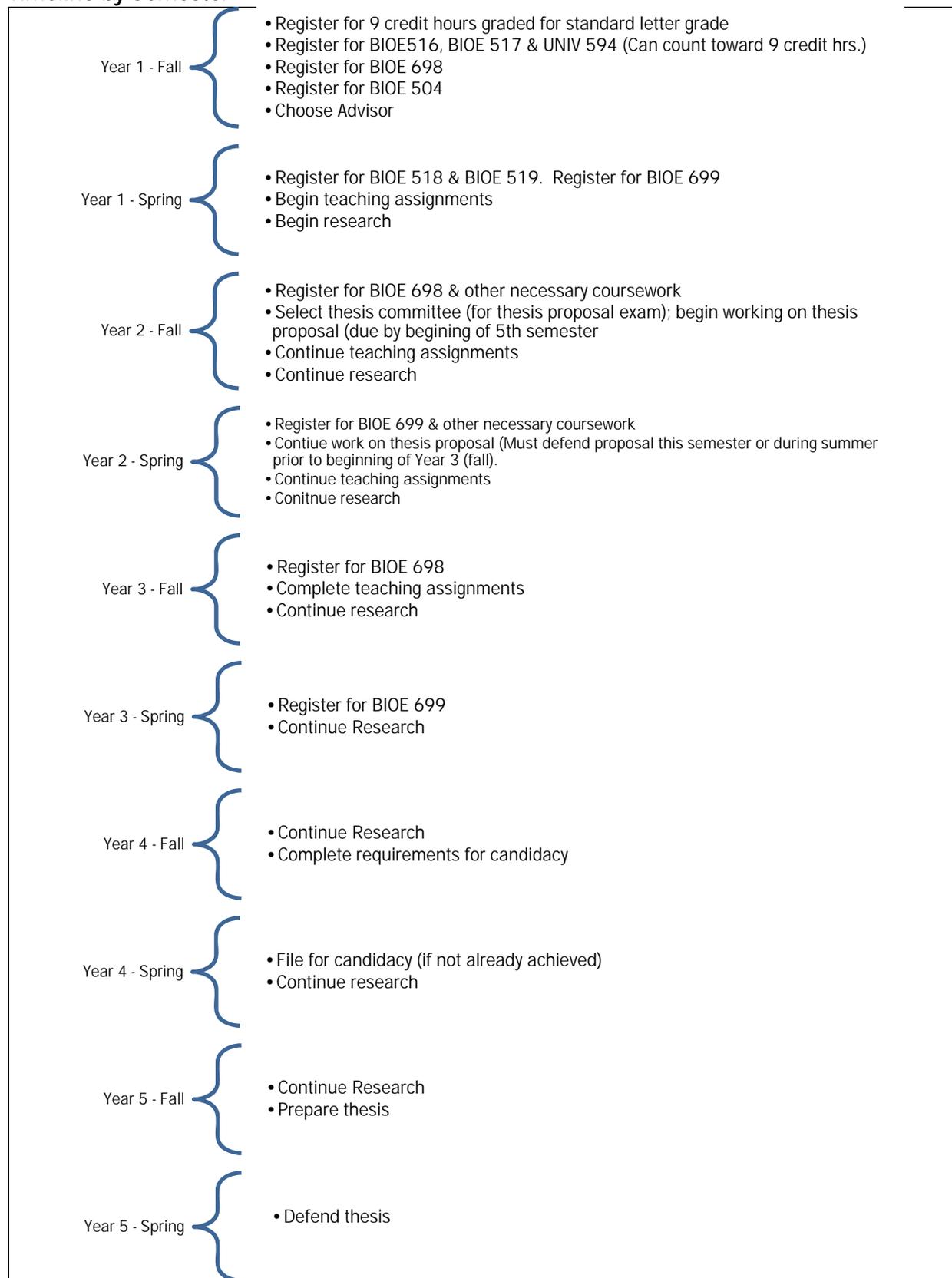
Extenuating Circumstances

Situations where the advisor may not have adequate funding to support supplemental stipends will be resolved on a case-by-case basis in consultation with the Chair of the Department.

**SUGGESTED TIMELINE FOR PhD STUDENTS**

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
Advisor Selection														
Teaching – Must complete 3.0 teaching credits														
Thesis Proposal														
Research														
Thesis Defense														

## Timeline by Semester



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## MASTER OF SCIENCE (MS) IN BIOENGINEERING

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.

### MS CURRICULUM

#### Components of Curriculum:

The MS curriculum consists of two components: foundation and advanced topic. Collectively these courses afford the student broad exposure to his or her chosen field of research interests.

- Complete a minimum of 30 credit hours of study (including thesis research hours).
- Complete a minimum of 18 credit hours of graduate level foundation, supporting (track) and advanced topics courses (graded for a standard letter grade).
- A minimum of 24 of the 30 required credit hours must be taken at Rice.

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:

- BIOE 516 – Mechanics, Transport, and Cellular Signaling (3 credits)
- BIOE 517 – Instrumentation and Molecular Analysis (3 credits)
- BIOE 518 - Introduction to Computational Biology (3 credits)
- BIEO 519 – Biomaterials (3 credits)
- UNIV 594 - Training in the Responsible Conduct of Research (1 credit)
- 400 level or higher mathematics (MATH), statistics (STAT) or computational and applied mathematics (CAAM) course (3 credits). Exceptions:
  - Introduction to Partial Differential Equations (Math 381) may be taken to fulfill the math requirement
  - Complex Analysis (Math 382) may be taken to fulfill the math requirement.
  - BIOE 439 is meant for undergraduates only and may not be used to meet the math requirement.

#### 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.

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

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courses BIOE 500 during the terms they are engaged in research.

### **Course Requirements:**

MS students must take at least 18 semester hours of graduate level foundation and advanced topic courses for a standard letter grade. At least 15 credit hours must be at the 500 level or above...

All coursework must at the graduate level except where specifically exempted for a course taken to meet a prerequisite requirement and counted toward the degree requirements (see section regarding "Prerequisites.>").

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 grade below a B- (2.67) may not be used to fulfill the coursework.

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.

The university minimum for the master's degree is 30 semester hours beyond the bachelor's degree. MS students must earn the additional credit hours 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.

Departmental policy requires that full-time students be registered for at least 9 credit hours each semester. If hours are needed in addition to course work, the student should register for BIOE 500, "Graduate Research." Students are expected to fulfill the research requirements as defined by their advisor to earn a "satisfactory" grade in BIOE 500.

### **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. Once the proposal is approved, the student will have yearly evaluation meeting with his or her thesis committee. 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. The student's signed progress report with any comments from the advisor/thesis committee will serve as this written assessment. A copy of the written assessment should be submitted to the BIOE Academic Program Administrator for inclusion in the student's record.

Students who fail to meet any of the requirements for satisfactory progress will receive letters of warning. Satisfactory progress is defined as and includes the following:

- 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.
- After the student's first semester in residence, students must work on their thesis research on a full-time basis.

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- 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.

Satisfactory/Unsatisfactory grades cannot be used to end probationary status.

## **PROGRESS REPORTS**

All Masters students are required to submit semiannual progress reports during their entire graduate career. Submission of progress reports is one criteria used to determine satisfactory performance.

Progress reports must be submitted to the student's advisor and, once selected, the members of the student's thesis committee. The advisor and committee will take this opportunity to discuss the student's progress with the student and make any recommendations to the student.

All reports will be on a calendar year basis and cover the time frames, January to June and July to December. The deadline for the January to June report is July 31<sup>st</sup>. The July to December report is due on January 31<sup>st</sup>.

Students should consult with their advisor to determine if he/she has specific formatting or other requirements. At minimum, the progress report should include the following:

- Student name, student ID number, and Rice email address
- Name of Advisor
- List of coursework completed during reporting period
- List of teaching assignments completed during reporting period
- List of publications or conference presentations by the student during reporting period

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- List of awards and accomplishments during reporting period
  - Description of research completed during reporting period (research progress and outcomes)
  - Description of work planned for next reporting period (courses likely to be taken during next reporting period, research plans and expectations).
  - Advisor's approval

Students must submit their progress report to their advisor for review and recommendations. If the student has selected a thesis committee, a copy must also be sent to each thesis committee member. Once the student's advisor has approved the final version, a copy must be forwarded to the Bioengineering Academic Program Administrator ([ges2@rice.edu](mailto:ges2@rice.edu)) by the appropriate deadline. Unsigned copies **will not** be accepted. Students should begin their reports in time to assure time for the advisor to review and approve it prior to the deadline.

### **TEACHING REQUIREMENT**

If the M.S. student receives departmental support during the MS study, the student must fulfill the teaching requirement as described in under *Teaching Requirement* for Ph.D. Candidates. If the student receives no departmental support the student is not required to fulfill a teaching requirement.

### **OPPORTUNITY FOR PRESENTATION OF RESEARCH**

Students are encouraged to discuss specific opportunities to present their research with their advisors. The GSA sponsors a Breakfast Club which offers an opportunity for peer reviewed research presentations. The department will provide additional opportunities for poster sessions during the year.

### **THESIS REQUIREMENTS**

The student must complete original work reported in a thesis and successfully defend his/her work in a public oral examination.

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.) The third member must be a faculty 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.

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## **APPROVAL OF CANDIDACY AND FINAL ORAL EXAMINATION**

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.

### **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.

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.

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.

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 completed thesis must be submitted in either final or advanced draft form to the committee members at least one week before the thesis defense. A copy must also be provided to the department (BIOE academic program administrator) at least one week before the thesis defense. This copy may be submitted electronically to [ges2@rice.edu](mailto:ges2@rice.edu). 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.

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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.

### **ACCEPTANCE OF THESIS**

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. A student's thesis must be submitted electronically. 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.

### **GRADUATION**

All degree candidates are also required to apply for their degree with the Office of the Registrar.

### **FINANCIAL SUPPORT**

MS students are governed by the financial support rules as the PhD program. 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 three or more (9 credit hours) advanced courses. Financial support is dependent upon satisfactory performance, reasonable progress toward degree requirements, and the availability of funds. Student stipends are subject to all of the usual federal taxes.

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## **MASTER OF BIOENGINEERING (MBE) DEGREE**

The Master of Bioengineering (M.B.E.) is a non-thesis degree that provides students with greater depth in their bioengineering training to advance their career objectives. Students may enroll on a full-time or part-time basis.

MBE students will be advised by members of the MBE Committee. Students will meet with an advisor prior to registration to discuss curriculum choices and degree requirements.

### **REQUIREMENTS**

Requirements for the MBE degree include the successful completion of 30 semester hours of upper-level courses including:

- 15 credit hours of graduate level bioengineering courses,
- 9 credit hours of professional development electives,
- 3 credit hours of general electives,
- 3 credit hours of either mathematics, statistics, or computer and applied mathematics
- 15 credit hours of course work at the 500 level or above.
- A minimum of 24 of the 30 credit hours must be taken at Rice.

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) 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.

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.

### **CURRICULUM**

Complete thirty (30) credit hours of courses including:

Fifteen (15) Bioengineering graduate level credit hours. (Refer to Appendix I for a list of graduate level bioengineering courses.)

- Graduate level bioengineering course taken to meet the professional development and general elective requirements may count toward fulfilling this 15 credit hour requirement.
- MBE students may take BIOE 506 (Graduate Independent Study) for a maximum of six (6) credit hours towards their MBE degree. Students interested in graduate independent study typically take 3 credit hours per semester. It is the student's responsibility to locate a faculty member willing to mentor them in the Independent Study course. The course workload should be equivalent to a 3-hour seminar. Clearly stated written goals and expectations should be established at the beginning of the project. The student must produce a final project in the form of a paper, a design project, or an exam. BIOE 506 must be taken for a standard letter grade.

Professional Development Electives: Nine (9) credit hours of professional development electives must be taken from the approved list of electives below:

Course #	Course Title	Semester Offered	Credit Hours
BIOE/BIOC 594	Responsible Conduct of Research	Fall	1
BIOE 633_or MGMT 734	Life Science Entrepreneurship Technology Entrepreneurship	Spring Fall	1.5 3
ENGI 315	Leading Teams and Innovation	Fall, Spring	3
ENGI 505	Engineering Project Management and Ethics	Fall	3
ENGI 510	Technical and Managerial Communications	Fall, Spring	3
ENGI 528	Engineering Economics	Spring	3
ENGI 529	Ethics and Engineering Leadership	Fall	3
ENGI 545	Structured Problem Solving	Spring	3
ENGI 610	Management for Science and Engineering	Fall, Spring	3

General Elective: Three (3) credit hours of approved upper level (300 level and above) electives may be from School of Engineering, but must be relevant to the degree and approved by the MBE Program Committee in advance).

Math Requirement: 400 level or higher mathematics (MATH), statistics (STAT) or computational and applied mathematics (CAAM) course (3 credits). Exceptions:

- Introduction to Partial Differential Equations (Math 381) may be taken to fulfill the math requirement
- Complex Analysis (Math 382) may be taken to fulfill the math requirement.
- BIOE 439 is meant for undergraduates only and may not be used to meet the math requirement.

Graduate Seminar: MBE students are encouraged but not required to attend Graduate Seminar (BIOE 698/BIOE 699). Since this course is graded on a satisfactory/unsatisfactory basis and cannot be counted toward the 30 required credit hours and official registration into course requires that students attend ALL lectures and meet all other course requirements, MBE students are discouraged from officially registering. These seminars are open to all students regardless of registration status, therefore, MBE students are invited to attend, as guests, all lectures of interest to them.

MBE students may not register or receive credit for BIOE 516, BIOE 517, BIOE 518, or BIOE 519.

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## **SATISFACTORY PROGRESS**

- MBE students must maintain a GPA of 3.0 or higher.
- Courses in which the student receives a grade below a B- (2.67) may not be used to fulfill the coursework requirement.
- The Office of Graduate and Postdoctoral Studies requires that students be provided a written assessment of their academic progress at the end of each semester. In the case of MBE students, the student's transcript meets this requirement. Should a student wish a more detailed assessment they are encouraged to speak to their course instructors or an advisor for the MBE program.

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 may be dismissed from the program without further notice. Decisions regarding dismissal will be determined by the MBE Committee with the approval of the Chair of the Department. Students whose GPA falls below 2.33 for two consecutive semesters (including the summer semester), 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 and/or dismissal once final grades have been received and posted to their records.

## **Graduation**

All degree candidates are required to apply for degree conferral through the Office of the Registrar.

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## **PETITIONS FOR EXCEPTIONS TO ACADEMIC REQUIREMENTS**

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:

- Student's name
- Student's ID number
- The specific exception requested
- Grounds (justification) for the request
- 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.)

### Academic Committee:

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

Graduate student appeals and problems at the department level will be handled by the Graduate Academic Affairs Committee or the MBE Committee as appropriate. 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. Petitions may be submitted via hard copy or by email to the BIOE Academic Program Administrator, Gayle Schroeder ([ges2@rice.edu](mailto:ges2@rice.edu)).

Appeals: A student may appeal a decision regarding a petition. Rice University guidelines allow only one level of appeal from a decision regarding a petition. In general, the appeal process will be resolved at the lowest level possible. When the petition is decided at the department level the appeal must be submitted to the school. Petitions to the School should be addressed to the Office of the Dean of Engineering and submitted via hard copy or email to the BIOE Academic Program Administrator, Gayle Schroeder ([ges2@rice.edu](mailto:ges2@rice.edu)) who will forward it appropriately.

An appeal must be submitted within 15 days from receipt of the decision that is being appealed. Late appeals will be dismissed, except for unusual situations when a delay is justified. Appeals must be acknowledged in writing immediately upon their receipt by the receiving unit.

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## COURSE REGISTRATION

Students should register via ESTHER. Log on using your ID and follow the instructions under the registration tab.

Special Registration Situations: There are instances when you will not be allowed to register via ESTHER but will, instead, be required to submit a Special Registration form. Examples of situations where a special registration form is required include, closed courses that have reached their maximum enrollment), closed courses requiring departmental or instructor permission, prerequisite override, audit, overlapped/double-booked courses and late add. The Special Registration form can be found at [http://registrar.rice.edu/online\\_forms/](http://registrar.rice.edu/online_forms/).

Double-Booking/Overlapping Courses: Double booking (Overlapping) courses is, prohibited with the exception of BIOE 698/699 (Graduate Seminar) and BIOE 633 (Life Science Entrepreneurship). If a student elects to do this, the student must submit a Special Registration form and receive approval of both instructors. Students must also assure they discuss the requirements of the courses with both instructors and are expected to meet all requirements of both courses. If a student is taking another course or has a TA assignment that conflicts with BIOE 698/699, the student should postpone enrollment in BIOE 698/699 until the next semester.

Students should carefully consider their course choices to assure they meet the degree requirements for their specific program. In the case of MS and PhD students, all course work must be completed by the deadline for candidacy.

Inter-institutional Courses: Under certain circumstances, inter-institutional courses may be taken at participating institutions including, Baylor College of Medicine, University of Texas Health Science Center At Houston, University of Texas Medical Branch at Galveston, and the University of Houston. Inter-Institutional Graduate Student Registration form and instructions can be found at [http://registrar.rice.edu/online\\_forms/](http://registrar.rice.edu/online_forms/).

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 against 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.

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.

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## GRADING PROCEDURES

Standard Letter Grade: Instructors are required to report a grade for all students whose names appear on the class roster of courses graded with a standard letter grade. Instructors grade their students using the following conventional symbols: A+, A, A-, B+, B, B-, C+, C, C-, D+, D, D-, F.

Pass/Fail Option: Students may take courses outside the Bioengineering department pass/fail. A student may later convert a pass/fail to a graded course by filing the appropriate paperwork with the Office of the Registrar. Students should be aware that while a grade of “pass” (P) does not affect their GPA, a grade of “fail” is registered as an “F” and does affect their GPA; therefore, it is important that students make a passing grade in courses taken in this manner. Students may NOT take BIOE courses as pass/fail regardless of their reason for taking the course (e.g. to meet prerequisite requirement).

Satisfactory/Unsatisfactory: BIOE 500, 698, and 699 are graded as “satisfactory” (S) or “unsatisfactory” (U). Students should be aware that while a grade of “S” or “U” does not affect their GPA, no credit will be awarded if a grade of “U” is received. Grades for these courses is one of the criteria used in determining satisfactory progress. Courses with a grade of “S” will not count towards the total number of graded credit hours required, but will count toward the total credits earned.

Audit: Currently enrolled students may audit one or more courses by securing permission of the instructor and by registering as an auditor with the Office of the Registrar. (This is done by completing a “Special Registration” form.) Students may audit courses at any time during their graduate program. There are no credit hours associated with audited courses, and auditing a course does not affect a student's GPA. Requests to audit a class or to change from audit to credit or vice versa must be done by the end of the second week of the semester. The grade designation “AUD” is used for people auditing a course, and specifically when the auditing student has met the audit requirements of the course as defined by the instructor. A grade designation of “NC” is given to student who do not meet the audit requirements.

For information on how the procedure used to calculate a grade point average (GPA) refer to [http://ga.rice.edu/GR\\_grades/](http://ga.rice.edu/GR_grades/).

Please refer to the Academic Calendar at <http://registrar.rice.edu/calendars/> to determine the deadlines for dropping a course. Students are allowed to drop a course after the drop deadline only in very rare circumstances.

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## **ENROLLMENT AND ATTENDANCE**

### **Continuous Enrollment**

All graduate students are expected to maintain continuous enrollment, unless an 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.

### **Full-Time & Part-Time Study**

PhD and MS students must enroll as full time students.

MBE students are allowed to register as part-time. Part-time MBE students must register for at least three hours in a semester. All time boundary and degree requirements apply to part-time students.

- MBE students who wish to become part-time time in the upcoming semester must obtain written permission from the academic department before the semester begins. Students who wish to obtain part-time status after the semester has started must also obtain the approval of the Office of Graduate and Postdoctoral Studies. Consult the BIOE Academic Program Administrator to begin the process of becoming part-time.
- International MBE students should consult the Office of International Students and Scholars about the possible impact on their visa status of dropping below full-time.

### **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, a 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.

### **Vacation Time**

During the first semester of study graduate students observe the same holiday schedule as other students engaged in course work. MBE students continue to observe the same holiday schedule as other student engaged in course work.

Beginning in the second semester, PhD and M.S. 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.

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## **Nonscheduled Absences**

### **PHD and MS Students:**

Active participation in required academic activities including laboratory work as 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.

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.

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.

### **MBE Students:**

Attendance at class meetings is essential to academic success. Students are expected to take personal responsibility for class attendance and bears the responsibility for the effect that absences may have upon class participation, announced and unannounced examinations, written assignments, reports, papers, and other means of evaluating performance in the course.

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## **TRANSFER BETWEEN BIOENGINEERING PROGRAMS**

Specific rules apply to students who request to be transferred between graduate programs.

**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.

**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.

**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.

**Transfer to a Graduate Program in a Different Department:** If a student wishes to transfer to a graduate program in a different department the student must be accepted into the other department's graduate program and must receive permission of both departments before the transfer can be approved. Final approval lies with the Office of Graduate and Postdoctoral Studies.

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## STUDENT REQUEST TO SWITCH ADVISORS

Since switching advisors will likely affect progress toward the degree and/or any financial support arranged by the previous advisor, students should not consider switching advisors except in exceptional circumstances. However, the department recognizes that in rare circumstances a student may feel their interests could be better served by working with a different advisor. Requests to voluntarily switch advisors will be handled on a case-by-case basis. In such cases the department will make every effort to assist the student, however, the student bears the ultimate responsibility of finding a new advisor.

### Procedure:

Students should first discuss issues with their current advisor in an attempt to resolve any concerns or problems.

If the student feels issues are insurmountable, he/she is encouraged to request the guidance of the Graduate Academic Affairs Committee or the Associate Chair for Academic Affairs.

If the student still wishes to switch advisors, the student should speak with an advisor whose research interests are in line with their interests, who is willing to serve as the student's advisor, and who has funding to support the student.

If the student finds another faculty member willing to serve as his or her advisor, the student should submit a petition to the Graduate Academic Affairs Committee (GAAC) for approval of the switch in advisors. This petition must have the endorsement of the new advisor.

If the Committee approves the switch, the Bioengineering Academic Program Administrator will process the paperwork required to switch advisors.

Note: Students may not initiate the process to change advisors more than twice nor have total of more than three advisors, including their initial advisor, during their tenure as a student.

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## DISMISSAL FROM GRADUATE PROGRAM

### PhD and MS Students

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.

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.

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.

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.

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.

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.

### 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.

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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.

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 due to lack of progress 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.

### **Professional Masters (MBE) Students**

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 maximum semesters. Final decision will be made by the MBE Program Committee in consultation with the Department Chair.

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

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

MBE students may accept employment on or off-campus without prior approval. The work performed must be incidental to work carried out in pursuit of the student's degree. Students are cautioned to balance their employment and academic activities so that they can appropriately meet their academic responsibilities.

International MBE students should consult the Office of International Students and Scholars about the possible impact of working full or part-time on their visa status.

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## GRIEVANCES AND PROBLEM RESOLUTION

Any student who has a conflict with a faculty member or a student colleague is first encouraged to seek to settle the conflict directly. Should this not be possible or should the conflict remain unresolved, the student may file a grievance with the Associate Chair of Graduate Studies. Graduate Student grievances and problem resolution at the department level will be handled by the Associate Chair for Graduate Studies in consultation with the Graduate Academic Affairs Committee or the MBE Committee as appropriate. If the student's advisor, members of his or her thesis committee, or other faculty involved in the conflict are members of these Committees they should reclude themselves during grievance procedures. Additional faculty members may be asked to serve in ad hoc positions to assure the student's grievance is heard by an adequate number of committee members.

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/>.

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

Course	Name	Credits	Level	Grade Mode
BIOE 400	Engineering Undergraduate Research	VARIABLE	UG	Standard
BIOE 401	Undergraduate Research	VARIABLE	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 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 439	Applied Statistics for Bioengineering and Biotechnology	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 447	Digital Design and Visualization	3	UG	Standard
BIOE 449	Trouble Shooting Workshop for Clinically Relevant Biomedical Equipment	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 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 480	Introduction to Neuroengineering; measuring and manipulating neural activity	3	UG	Standard
BIOE 481	Computational Neuroscience and Neuroengineering	3	UG	Standard
BIOE 482	Physiological Control Systems	4	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

Course	Name	Credits	Level	Grade Mode
BIOE 490	Intro Computational Systems Biology Modeling and Design Principles of Biochem 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 (Med-Into-Grad Only)	Sat/Unsat.
BIOE 502	Physical Biology	3	Graduate	Standard
BIOE 503	Graduate Independent Study	VARIABLE	Graduate	Sat/Unsat.
BIOE 504	Graduate Lab Rotation	3	Graduate	Sat/Unsat
BIOE 505	Optical Imaging	3	Graduate	Standard
BIOE 506	Graduate Independent Study	VARIABLE	Graduate (MBE Students Only)	Standard
BIOE 507	Systems Biology of Blood Vessels	3	Graduate	Standard
BIOE 508	Synthetic Biology	3	Graduate	Standard
BIOE 510	Seminar in Tropical Medicine	1	Graduate	Sat/Unsat.
BIOE 512	Biophotonics Instrumentation and Applications	3	Graduate	Standard
BIOE 516	Mechanics, Transport, and Cellular Signaling	3	Graduate (PhD Students Only)	Standard
BIOE 517	Instrumentation and Molecular Analysis	3	Graduate (PhD Students Only)	Standard
BIOE 518	Introduction to Computational Biology	3	Graduate (PhD Students Only)	Standard
BIOE 519	Biomaterials	3	Graduate (PhD Students Only)	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 548	Statistical Signal Processing and Machine Learning for Neuroscience Applications	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 560	Cancer Biology	3	Graduate	Standard
BIOE 564	Bioinformatics: Network Analysis	3	Graduate	Standard
BIOE 574	Continuum Biomechanics	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	3	Graduate	Standard

Course	Name	Credits	Level	Grade Mode
BIOE 581	Cardiovascular and Respiratory System Dynamics	3	Graduate	Standard
BIOE 586	Respiratory System Mechanics	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
UNIV 594	Training in the Responsible Conduct of Research	1	Graduate	Sat/Unsat.
BIOE 595	Modeling Tissue Mechanics	3	Graduate	Standard
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.