POLICIES AND REGULATIONS

Governing Graduate Students in the Department of Biomedical Engineering 2015-2016
# PhD Checklist

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<th>Item</th>
<th>Due Date</th>
<th>Submit to</th>
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<td>Rotation Preference Sheet</td>
<td>Friday first week of classes</td>
<td>Director of Doctoral Studies</td>
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<td>1st Rotation Report</td>
<td>January 15</td>
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<td>2nd Rotation Report</td>
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<td>3rd Rotation Report</td>
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<td>Proposed rotation document, 3 person qualifying exam committee</td>
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<td>and 4 topic area submitted for approval (schedule exam as soon as your committee is approved)</td>
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<td>1 rotation – Dec 1</td>
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<td>2 rotations – April 1</td>
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<td>Rotation report for examination</td>
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<td>1 rotation – Feb 28</td>
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<td>2 rotations – June 30</td>
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POLICIES AND REGULATIONS
FOR GRADUATE STUDENTS
IN BIOMEDICAL ENGINEERING

1. REGISTRATION

Registration takes place each semester on dates announced by the University. Detailed instructions for registration plus necessary materials are mailed directly to all graduate students enrolled during the previous semester.

All graduate students in the department must register each semester until all degree requirements are completed. There are two categories of registration:

Active: Normally students register in this category until they have earned the total number of credit hours required for their degree. Ph.D. students register for 9 hours of courses and/or research each semester until 72 hours are completed. After earning the required number of credit hours and fulfilling the course degree requirements, the student registers for BME 884 Continuing Student Status until graduation.

Inactive: Students who have not completed their course requirements but who, because of personal reasons, must suspend their studies temporarily may register as inactive students with the approval of their adviser, the Director of Doctoral Studies and the Graduate School. See the Graduate School of Arts and Sciences Graduate School Bulletin for further information.

Students who fail to register in one of the previously mentioned categories will automatically have their graduate standing revoked. See the Graduate School of Arts and Sciences Graduate School Bulletin for further information. Candidates for the Ph.D. degree who apply for reinstatement are required to repeat the qualifying examinations.
2. ADVISING

**Academic Advisor:** Each entering graduate student will be assigned an academic advisor by the Director of Doctoral Studies or the Director of Masters Studies. This advisor will be a full-time faculty member in the Department of Biomedical Engineering and will be responsible for acquainting the student with degree requirements, including the required laboratory rotations.

**Rotation and Research Mentors:** Each Ph.D. student is required to participate in two research rotations, with the option to perform a third research rotation. A Masters research thesis may count as one rotation. Rotations serve two primary purposes for students: to inform students in their choice of a doctoral research mentor and research project, and to gain skills in laboratory research. Each rotation will be supervised by a rotation mentor who is a Graduate Group faculty member of the BME department. Please see the department website for current members of the Graduate Group ([http://bme.wustl.edu/Research/Pages/default.aspx](http://bme.wustl.edu/Research/Pages/default.aspx)). Within each ‘Research Area’, the Graduate Group consists of both the ‘Primary’ and ‘Affiliated’ Faculty. The ‘Primary’ faculty are tenured/tenure track BME faculty listed here: [https://bme.wustl.edu/faculty/Pages/default.aspx](https://bme.wustl.edu/faculty/Pages/default.aspx). For the full list of affiliated BME faculty, see: [https://bme.wustl.edu/faculty/Pages/affiliated-faculty.aspx](https://bme.wustl.edu/faculty/Pages/affiliated-faculty.aspx)

Only members of the Graduate Group may serve as research mentors. If a Ph.D. student has already been accepted into the research group of a member of the Graduate Group, the student may perform a rotation in the lab of a faculty member outside the Graduate Group. The rotation mentor will be responsible for outlining the student’s project, as well as reviewing and approving the student’s report at the end of the rotation.
The choice of the research mentor and thesis project will have a profound effect on the career of the Ph.D. student. To aid the Ph.D. student in these decisions, the following procedures are in place:

i. Rotation Preference Sheets
At the start of the academic year, the Graduate Group faculty will be invited to meet entering graduate students to discuss their research programs. Afterwards, entering students will formulate a research plan in consultation with the academic advisor and potential research mentors. The student will submit the research plan to the Director of Doctoral Studies identifying his/her first, second, and third choices of labs in which to do rotations. Along with this list, the student will submit a written description of their current research interests and the rationale behind the research plan. The goal of this process is to help the student develop a coherent plan for the rotations and make well-informed decisions in the selection of a research mentor.

ii. Rotation Selection
The Director of Doctoral Studies will review the rotation preference sheets and assign each student to rotation mentors. At the end of the first rotation, students will have the option to update their research plan and preference for their second rotation.

iii. Rotation requirements
Each student will complete 2-3 rotations during their first 12 months in the program. The first 2 rotations will normally coincide with the Fall and Spring semesters; a third optional rotation would be performed during the first two months of the summer. Typically students will spend at least 15-20 hours/week on rotations while classes are in session and at least 40 hours/week when classes are not in session. At the end of each rotation, the rotation mentor will complete an evaluation of the student. These evaluations will become part of the student’s permanent file and will be considered by the qualifying exam committee during the qualifying examination (see Section 3.2c). Students will complete all rotations by the end of the summer of their first year and pick a research lab for their
doctoral research at this time. **For each rotation, students will register for BME 601, using the rotation mentor's section number.**

The student’s thesis research mentor will usually be one of his/her rotation mentors. The thesis research mentor must be a BME Graduate Group faculty member. The faculty member must agree to be the research mentor.

**iv. Qualifying Examination Committee:** Following the final rotation, the student is to submit their suggested 4 topic areas (1 life science, 1 mathematics and 2 engineering topics) to be examined on as well as a suggested three member committee (see Section 3.2c) to the Director of Doctoral Studies. At least one committee member must be qualified to examine the student in each of the four topic areas. The Director of Doctoral Studies will review for approval or make changes as necessary and invite the members to serve on the committee. The qualifying exam must be completed by the end of the first 12 months in the program (or within two months of completion of the final rotation, whichever comes first).

**v. Thesis Committee:** Students preparing a thesis for the Master of Science will have a three-member thesis committee appointed by the Director of Doctoral Studies and headed by the research mentor. This committee will be responsible for monitoring his/her progress and hearing, critiquing and approving the student’s thesis. For Ph.D. students, the dissertation subject must be approved by a Research Advisory Committee, and this approval is obtained by successfully passing the thesis proposal. In BME, the Research Advisory Committee is the same as the thesis committee. The thesis committee monitors the student’s progress until completion of the Ph.D. and must approve the dissertation via a successful dissertation defense. The Research Advisory/thesis committee must consist of 5 members (mentor plus 4 other members) that meet the following requirements:
Members 1 – 3
BME ‘Primary’
https://bme.wustl.edu/faculty/Pages/default.aspx or ‘Affiliated’ faculty’ https://bme.wustl.edu/faculty/Pages/affiliated-faculty.aspx
(At least 2 of the 3 members must be primary BME).

Member 4
Faculty from inside or outside of the program (use links above for faculty inside the program).

Member 5
Faculty (or scholar in private sector or government) from outside of the program.

Additional requirements:
(i) One of the five members must be from the Washington University School of Medicine (may be in graduate group but not required)
(ii) Four of the five members must be tenure or tenure-track at Washington University; if tenure/tenure-track at Washington University, must have a doctoral degree and be research active.

3. DEGREE REQUIREMENTS

3.1 Master of Science (M.S.)
Candidates for the M.S. must accumulate a total of 30 graduate course credits beyond the bachelor’s degree. Only 6 of the 30 graduate course credits may be transferred from another university.
There are two options, thesis and non-thesis:

Thesis option: For this option, a minimum of 24 credits of course work is required, with the balance being thesis research. The courses must fulfill the core curriculum requirement (see Section 4). The remainder of the coursework is generally driven by the student’s research interest. Upon completion of the thesis, the candidate must pass an oral defense conducted by his/her thesis committee. This will consist of a public presentation followed by questions from the committee. Candidates must have a cumulative grade point average of 2.7 or better to receive the degree.
Non-thesis option: Candidates must accumulate a total of 30 graduate credits, have a cumulative grade point average of 2.7 or better, and satisfy the core curriculum requirements. The balance of the course credits should be selected with a view toward coherence reflecting a specialization in a research area.

3.2 Doctor of Philosophy (Ph.D.)

a. Academic Requirements
Candidates for this degree must complete a total of 72 credits beyond the bachelor’s degree. Of these, a minimum of 36 must be graduate coursework and a minimum of 24 thesis research (i.e. BME 600). The coursework must fulfill the core curriculum requirement (see Section 4). To be admitted to candidacy, the student must have completed at least 18 credits at Washington University, have an overall GPA greater than 3.0, and pass the qualifying examination as described below. He/she must also have completed the research rotations.

b. Research Rotation Reports
Within three weeks of the end of each rotation, the student will submit a document to the rotation mentor satisfying one of the following two options:

(i) A report on the research conducted by the student during the rotation, written in the form of a standard research journal article. The report must include the following: a) student’s name; b) title of report; c) semester/year of the rotation; d) rotation mentor’s name; and e) date of report. This document should be double-spaced. There is no page limitation, although the reports should be concise. If the project has not been completed, preliminary or partial results are to be described. It is recommended that this document contain the following sections:

Abstract. In one paragraph, summarize the objectives, methods, main results and conclusions.
Introduction: Describe the motivation for and objectives of the research.

Methods. Give the details of the procedures and calculations.

Results. Describe the results of the study, referring to graphs, tables and illustrations by number.

Discussion. List the main findings and put them in the context of previously published work on the topic. Discuss the meaning and implications of your results, any surprising findings, sources of error, limitations, etc. Support any assertions by referring to specific data or previously published work.

References. List pertinent articles.

(ii) If insufficient data exists for a research report, the student may alternatively write a critical review of a published research article selected by the mentor. This journal article should not be a review article and none of the authors can be associated with Washington University. The review should be no longer than 20 pages of double-spaced text (12 point type with one-inch margins), excluding figures. This review should contain the following sections:

Questions addressed. Identify the key questions addressed and the reasons for examining them.

Background. Discuss the most significant related research that had been published prior to this article.

Critical Appraisal. Discuss the author’s approach and contribution to the solution of the questions listed above. Compare the author’s approach and contribution to those of previous investigators.

Proposal for additional research. Propose in concrete terms research that might be done to extend and (if necessary) improve upon the study.

References. List pertinent additional articles.

The rotation mentor must approve the report by signing and dating the cover page of the report. One signed copy of the document (including the selected article for option (ii)) should be submitted to the Graduate Student Administrator no later than 4 weeks after the end of the semester or two weeks prior to the qualifying exam,
whichever is earlier. All rotation reports must be submitted prior to the qualifying exam.

c. Qualifying Examination:
Because the Ph.D. is primarily a research degree, the qualifying examination is designed to assess the candidate’s aptitude for independent research. After the rotation reports have been submitted to the Graduate Student Administrator, the student will select one of the rotation documents as the basis for the qualifying examination. The student must have a minimum GPA of 3.00 to stand for the qualifying examination.

Considering a list of faculty members submitted by the student at least one month before the end of the last rotation, the Director of Doctoral Studies will select the members of the examining committee and four topic areas that will be covered in the examination. This committee will consist of three faculty members, excluding the rotation mentor, and shall have at least one full-time member of the BME department. The rotation mentor may attend the exam but cannot ask or answer any questions (except to clarify a point of confusion) and cannot vote. Copies of the rotation report are to be distributed to the members of the examining committee at least two weeks before the date of the exam. The committee will review the rotation report along with the student’s transcript and rotation mentor’s evaluations.

Before Sept. 1 of the second year (or July 1 if only two rotations were performed; or otherwise within eight weeks of the end of the last rotation), the student will appear before the qualifying examination committee for an oral examination consisting of a 20-minute presentation by the student and questions by the examining committee. The questions may address any issues directly related to: 1) the document or the oral presentation, and 2) principles of biomedical engineering pertinent to the four topic areas assigned by the Director of Doctoral Studies.
Considering the performance on the oral examination, the written report, the evaluations from all the rotation mentors, the student’s coursework, and the student’s GPA, the qualifying examination committee will recommend that:

- The student passes the qualifying exam.
- The student must retake the examination.
- The student must successfully pass specified remedial courses or other requirements specified by the committee to pass the qualifying exam.
- The student will be asked to leave the program.

Following successful completion of the qualifying examination, the student will select a research area and a mentor (usually this will be the same area and mentor selected for the qualifying examination). The student and mentor will decide upon a suitable problem whereupon the student will prepare a comprehensive written research proposal that includes a thorough survey of the field, a discussion of those areas needing further research, and a tentative but clear definition of the proposed research. Results of preliminary studies or feasibility studies should be included. This proposal will be submitted to the thesis committee at least two weeks prior to an oral presentation and questions before that committee. This should be completed by the end of the third year in the doctoral program. However, the student must meet with the thesis committee annually to maintain active status within the doctoral program. Thus, the thesis committee must be formed and meet within one year of the student passing the qualifying exam. The composition of the thesis committee may change as the research problem evolves.

The format of the written proposal will be similar to an NIH Predoctoral Fellowship Application: (1) Specific Aims (1 page) (2) Research Strategy (6-10 pages max, single spaced, 11 point font, 0.5” margins). ‘Specific Aims’ are proposed tasks that each address a hypothesis (question) or provide technical milestones. The specific aims should be broad enough to result in one or more publications if
successful. ‘Research Strategy’ should include the following sections: (a) Significance – why is the problem important, what has been done already, what part of the problem will be addressed in the dissertation, (b) Approach – describe in detail experiments/simulations to be performed or devices designed for each specific aim, including preliminary data, which may be unpublished or published by you or your lab, and methods. Ensure that proper controls are performed, and that the number of samples/experiments/simulations is sufficient to answer the question, but not greater than can be accomplished by one person within a few years.

e. Teaching Assistant Requirement
After passing the qualifying exam but before the thesis defense, the student must fulfill a University-wide Teaching Requirement in a BME course. During that semester, the student will perform this duty in addition to the normal coursework and research duties that are expected by the research advisor. Ph.D. candidates should accumulate a minimum of 14 units of teaching experience at the basic level. A unit of teaching for the basic requirement may be defined broadly as an hour spent communicating with a group of students or scholars in the following ways:

• teaching students in grade school and high school about science and engineering
• giving lectures in undergraduate classes
• conducting discussion sessions in undergraduate classes
• conducting recitation sessions in undergraduate classes
• giving lectures in laboratory courses that introduce or interpret the experiments
• running help sessions in which the graduate student explains the background and methodology of engineering approaches (involving a lesson plan)

➤ holding office hours or grading assignment/exams does not count as teaching
Students should register for E62 602 ## to document their teaching assistantship in addition to submitting required documentation to the instructor for the course you TA’d for approval.

**DOCUMENTATION OF COMPLETION OF THE BASIC TA requirement should be submitted by August 31 at the end of the third year of the PhD program.**

Ph.D. candidates should also accumulate at least 4 units of teaching experience at the advanced level. The Graduate School recognizes that opportunities for such experience will vary widely across the disciplines within the University, and so is flexible as to what experiences count toward this accumulation.

A unit of teaching for the advanced requirement may be defined broadly as an hour spent communicating with a group of students or scholars in the following ways:

- teaching lectures in graduate classes
- giving seminars and presentations to research groups
- giving seminars and presentations to other students and faculty (for example, the thesis proposal or thesis defense)
- presenting papers at conferences
- giving lectures in advanced undergraduate classes
- running an advanced laboratory experience

In addition to the “14/4” requirement, students must attend the TA training workshop held in August and one additional workshop or seminar conducted by the Teaching Center to fulfill the teaching requirement. Documentation of attendance by the Teaching Center will be used to verify this requirement. Information on the teaching training and workshops can be found at [http://teachingcenter.wustl.edu/](http://teachingcenter.wustl.edu/)

f. **Thesis defense.**
Upon completion of the thesis, the candidate must present the thesis in a public forum and successfully defend the thesis before a committee consisting of the original thesis committee plus additional faculty as required. For Ph.D. candidates the Title, Scope and Procedure form must be registered in the Arts & Sciences Graduate School at least six months before the dissertation examination, or by the end of the fourth year, whichever comes first. The dissertation must be approved by the Research Advisory/thesis Committee as part of the final examination. For the requirements for the composition of the Research Advisory/thesis committee, please see section 2.v

The student should not stand for the defense until after the acceptance of one paper in a peer-reviewed journal and submission of a second manuscript to a peer-reviewed journal, with the student as first author (or co-first author) on both.

4. COURSE SELECTION

Students formulate their course program in consultation with their academic advisor. A core curriculum is required to be completed by both Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) students. This core curriculum requires:

- Two graduate courses in life sciences
- One graduate course in the area of mathematics
- One graduate course in the area of computer science
- BME courses as specified below.

For M.S. students, the BME courses of the core curriculum are three courses selected from the list below. For Ph.D. students, the BME courses of the core curriculum are five courses from the list below, with three of these courses being in different graduate educational programs. Other courses may fulfill this requirement and may be added to this list at the discretion of the Director of Doctoral Studies.
## Educational Programs and Constituent Courses

### Biomaterials & Tissue Engineering
- **BME 511** Biotechnology Techniques for Engineers
- **BME 523** Biomaterials Science
- **BME 524** Tissue Engineering
- **BME 525** Engineering Aspects of Biotechnology
- **BME 527** Design of Artificial Organs
- **BME 564** Orthopedic Biomechanics – Cartilage/Tendon
- **BME 563** Orthopedic Biomechanics – Bones and Joints
- **MEMS 5560** Interfaces and Attachments in Natural and Engineered Structures
- **MEMS 5607** Introduction to Polymer Science & Engineering

### Cardiovascular Engineering
- **BME 556** Experimental Methods in Biomechanics
- **BME 557** Cell and Subcellular Biomechanics
- **BME 559** Intermediate Biomechanics
- **BME 562** Mechanics of Growth and Development
- **BME 567** Cardiac Mechanics
- **BME 568** Cardiovascular Dynamics
- **BME 573** Applied Bioelectricity
- **BME 574** Quantitative Bioelectricity and Cardiac Excitation
- **BME 575** Molecular Basis of Bioelectrical Excitation
- **BME 5901** Integrative Cardiac Electrophysiology

### Imaging
- **BME 502** Cardiovascular MRI
- **BME 589** Biological Imaging Technology
- **BME 5907** Advanced Concepts in Image Science
- **BME 591** Biomedical Optics I: Principles
- **BME 592** Biomedical Optics II: Imaging
- **BIOL 5146** Principles and Applications of Biological Imaging
- **ESE 438** Applied Optics
- **ESE 588** Quantitative Image Processing
- **PSYCH 4450** Functional Neuroimaging Methods
Molecular, Cellular, and Systems Engineering
BME 422   Kinetic in Cell Signaling and Metabolism
BME 521   Kinetics of Receptor-Mediated Processes
BME 537   Computational Molecular Biology
BME 541   High Throughput Systems Biology
BME 558   Biological Transport
BME 5610  Protein Structures and Dynamics
BME 5903  Physical Methods for Biomedical Scientists
BME 5913  Molecular Systems Biology: Computation & Measurements for Understanding Cell Physiology and Disease
BIOL 5311 Dynamics in Mesoscopic Molecular Systems
BIOL 5312 Macromolecular Interactions

Neural Engineering
BME 471   Bioelectric Phenomena
BME 533   Biomedical Signal Processing
BME 572   Biological Neural Computation
BME 5910  Reverse Engineering the Human Brain

Courses that fulfill the life science requirement
BME 530A  Molecular Cell Biology for Engineers
BME 503A  Cell & Organ Systems
BME 538   Cell Signal Transduction
BME 5902  Cellular Neurophysiology
BME 5909  Physiology of the Heart
BIOL 4071 Developmental Biology
BIOL 4810 Biochemistry
BIOL 508  Fundamentals of Molecular Cell Biology
BIOL 5319 Molecular Foundations of Medicine
BIOL 5051 Foundations in Immunology (4 units)
BIOL 5062 Central Questions in Cell Biology
BIOL 5224 Molecular, Cell, and Organ Systems
BIOL 5285 Fundamentals of Mammalian Genetics
BIOL 5352 Developmental Biology
BIOL 5488  Genomics
BIOL 5571  Cellular Neurobiology (4 units)
BIOL 5651  Neural Systems
BIOL 5581  Neural Basis of Acoustic Communication
BIOL 404  Laboratory of Neurophysiology
BIOL 548  Nucleic Acids and Protein Biosynthesis
BIOL 5663  Neurobiology of Disease

Courses that fulfill the mathematics requirement
BME 5912  Applied Mathematics for Biomedical Sciences
ESE 502  Mathematics of Modern Eng. II
ESE 517  Partial Differential Equations
ESE 520  Probability and Stochastic Processes
MATH 449  Numerical Applied Mathematics
PHY501  Methods of Theoretical Physics I
PHY502  Methods of Theoretical Physics II
PHY503  Advanced Math Methods for Physicist & Eng. I
PHY504  Advanced Math Methods for Physicist & Eng. II

Courses that fulfill the computer science requirement
BME 550  Numerical Methods for Computational Modeling in Biomedicine
CSE 501N  Programming Concepts and Practice
CSE 502N  Fundamentals of Computer Science
CSE 504N  Object-oriented Software Development Lab
CSE 511A  Introduction to Artificial Intelligence
CSE 515T  Bayesian Methods in Machine Learning
CSE 517  Machine Learning
CSE 543T  Algorithms for Nonlinear Optimization
CSE 554A  Geometric Computing for Biomedicine
CSE 555  Computational Photography
CSE 559A  Computer Vision
CSE 5411  Advanced Algorithms
MEMS 5510  Finite Element Analysis
Additional courses may fulfill the life science, mathematics or computer science requirements, dependent upon your background and at the discretion of the Director of Doctoral Studies.

The normal load for M.S. students engaged in classroom instruction is 12 credits per semester. The normal load for Ph.D. students is 9-10 credits per semester plus a rotation, research assistantship or a teaching assistantship. A rotation is considered a half-time appointment and at least 15-20 hours per week should be spent on the rotation. A graduate student registered for research credits is automatically classified as full time whether or not additional courses are taken. Students employed full time, either on or off campus, are limited to a maximum of 6 credits per semester. Up to two 400-level courses may be counted towards the 36 units of graduate coursework required for the Ph.D. (not including independent study courses, journal clubs or seminar-based courses). Following selection of the research mentor, the student should choose the remaining coursework in consultation with the research mentor. The academic advisor should be notified of these coursework choices.

For additional requirements for the Ph.D. degree, also see the Graduate School of Arts & Sciences Graduate School Bulletin: http://graduateschool.wustl.edu/current_students/degree-requirements

For additional requirements for the M.S. degree, also see the School of Engineering and Applied Sciences website at: http://engineering.wustl.edu/current-students/student-services/Pages/graduate-catalog.aspx#MastersThesis

5. FINANCIAL AID

Graduate students preparing to enroll and work toward a degree in the department may apply for financial assistance. In the case of students entering the department for the first time, applications are
evaluated and awards made strictly on a merit basis. Academic achievements and satisfactory performance in research and other assignments while at Washington University are the primary factors governing continuation of financial aid.

Students who are placed on academic suspension will automatically have their financial assistance canceled, effective with the date of suspension. (For the regulations governing academic probation and suspension, please refer to the School of Engineering and Applied Science Web site, http://www.engineering.wustl.edu.)

5.1 Types of Awards
There are four types of financial assistance awards available to graduate students in the department:

a. Fellowships
Fellowships are grants generally providing full tuition plus a stipend. Except for the required teaching duties, no specific duties are required in return for this financial aid. Fellowships may be awarded for one to three years with renewability contingent upon performance.

Fellowship funds may derive from government or private sources. They may be administered by the department or they may be awarded directly to the student by an external agency, e.g., the National Science Foundation. (In the case of NSF Fellowships students must apply directly to the foundation.)

b. Traineeships
Traineeships may be funded by the Schools of Engineering and Medicine and administered by the departmental chair, or they may be associated with specialized, externally sponsored training grants. In the latter case, the traineeship has a definite term (9 or 12 months) and is generally renewable depending upon academic performance and continuation of the grant. Holders of such traineeships are normally obliged to follow a course program specified by the
particular training grant and may be assigned duties on relevant research projects.

Traineeships funded by the University are normally awarded only to students during their first two semesters. They provide up to 9 credits of tuition remission per semester plus a monthly stipend.

c. **Teaching Assistantships**
Teaching assistantships are funded by the department. They are normally awarded to first- and second-year students who have expressed an interest in a teaching career and who have acceptable English language skills.

The duties of teaching assistants normally include the grading of papers, laboratory reports, and/or laboratory supervision in undergraduate courses. Assignments are made by the Director of Doctoral Studies and teaching assistants are responsible to the professors in charge of the various courses and laboratories.

Teaching assistantships are awarded on a 12-month basis for half-time effort. As such the average time required is not to exceed 20 hours per week. The assistantships provide up to 9 credits of tuition remission per semester plus a monthly stipend, which is the allowable limit for a half-time assistant. During academic year periods of recess and summers, teaching assistants will be assigned duties relating to future course preparations and/or will be expected to participate in one or more research activities.

d. **Research Assistantships**
Research assistantships are funded directly from government or industry grants and contracts. They are normally awarded to students who have advanced to candidacy and made a commitment to a particular research area and who, by virtue of their academic background and record, satisfy a particular project’s staffing needs.
Research assistantships are normally supplemented by tuition scholarships that may be funded jointly by the Schools of Engineering and Medicine. Research assistants are responsible to the project director (principal investigator) of the project. (Generally, this same individual eventually assumes the additional role of thesis or dissertation supervisor.)

Research assistants are paid a regular monthly stipend. During the academic year a research assistant is considered to be employed half-time on a research project and, as such, is not permitted to register for more than 9 hours of graduate credit per semester. A minimum of 20 hours of work per week is required on the research project. However, graduate assistants whose thesis research coincides or overlaps with their project assignment are expected to devote more than this minimum effort to research, and, in fact, the student’s diligence and devotion will be important factors in renewal of the assistantships. It is important to note that it is the prerogative of the project director to terminate a research assistantship at any time for unsatisfactory performance.

Research assistantships are continued during the summer and renewable for the next year at the discretion of the project director and providing funds are available. Summer appointments are at the same rate as during the academic year, but full-time effort is expected.

5.2 Tax Liability
The taxability of the various types of awards described above is determined by current policy of the U.S. Internal Revenue Service. It is prudent to assume that all stipends are fully taxable and that tax will be withheld. Questions concerning any individual’s tax liability must be referred to the IRS.

5.3 Outside Employment
Holders of fellowships, traineeships and assistantships are required to devote full time to graduate studies. They are not permitted to
engage in any outside employment without special permission of the department chair.

External Professional Activity for Full-Time PhD Students in SEAS
If approved by their dissertation mentor in writing, doctoral students may engage in limited external professional activity. Any professional activity associated with a faculty member's personal company or affiliated companies must follow the guidelines and be approved by the University's Disclosure Review Committees (DRC). It is expected that external professional activity will be conducted in a way that will not interfere with normal laboratory duties nor impede in any manner progress toward completion of the doctoral degree. The number of hours per week must be approved by the mentor, but may not be more than 10 hours per week total for all activities, and the number of hours worked must not violate any other rule, policy or law. International students will also have to receive approval from the University's Office for International Students and Scholars. The thesis committee must be informed and routinely updated on all external professional activities. Departments may have additional oversight, guidelines and restrictions for their own doctoral students' involvement in external professional activity.

5.4 Time Off
Graduate students receiving financial support are expected to commit themselves fully to their studies and research regardless of whether classes are in session. Intersession periods listed in the University Academic Calendar denote times when classes are not in session. Graduate students in residence should, however, utilize these periods to further their studies and research. Intersession periods are not vacation for graduate students receiving financial support and students are expected to work full time on research during these periods.

Students on full support are permitted to take off a maximum of two weeks during the calendar year. In addition, students are permitted to take off on the university scheduled holidays. Additional time off
can be arranged but must be approved ahead of time by the mentor or Director of Doctoral Studies (in the case of first years). This will result in a reduction of the student’s stipend. Absences of research assistants must be scheduled so as not to impede the progress of an ongoing research project and should be cleared with the project director.

6. OTHER POLICIES

6.1 Seminars
Each year the department sponsors or participates in a series of seminars by visiting lecturers and Washington University faculty and students. All full-time graduate students are required to enroll in BME 501 - Graduate Seminar, which is a pass/fail course carrying no credit. A passing grade is required for each semester for all full-time students and is earned by regular attendance at these events.

6.2 Secretarial Service
Department secretaries do not generally provide clerical services to graduate students except in connection with scheduled courses and sponsored research projects.

6.3 Copying Service
Graduate students may not charge copying work to the department or a research project without prior authorization. Personal copies can be charged to a student’s personal account. The cost of copying dissertations beyond the three copies required by the department is considered a personal obligation.
This is a compilation of policies and regulations applicable to graduate students in the Department of Biomedical Engineering. Students should also become familiar with the general regulations of the Graduate School of Arts and Sciences as described in the School’s website at http://artsci.wustl.edu/GSAS and Henry Edwin Sever Graduate School of Engineering and Applied Science as described in the School’s Web site: www.engineering.wustl.edu

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**Graduate Student Administrator**
Karen Teasdale
Whitaker Hall 190C
314-935-6164
E-mail: teasdalek@wustl.edu
<table>
<thead>
<tr>
<th>Completed</th>
<th>Item</th>
<th>Due Date</th>
<th>Submit to</th>
</tr>
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<tr>
<td>________</td>
<td>Proposed Thesis Committee</td>
<td>End of 2nd year</td>
<td>Director of Doctoral Studies &amp; Graduate Student Admin.</td>
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<tr>
<td>________</td>
<td>Attended TA Orientation</td>
<td>August of year 2 or 3</td>
<td>Graduate Student Admin.</td>
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<tr>
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<td>Attended TA Workshop</td>
<td>December of year 3</td>
<td>Graduate Student Admin.</td>
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<td>Teaching Requirement Fulfilled</td>
<td>Immediately upon completion of requirement</td>
<td>Graduate Student Administrator</td>
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<td>________</td>
<td>Thesis Proposal Scheduled</td>
<td>June 1 (of 3rd year)</td>
<td>Director of Doctoral Studies &amp; Graduate Student Admin.</td>
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<tr>
<td>________</td>
<td>Thesis Proposal (Written) Completed</td>
<td>2 weeks prior to proposal date of June 30th of 3rd year (whichever is earlier)</td>
<td>Thesis Proposal Committee</td>
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<tr>
<td>________</td>
<td>Thesis Proposal (Oral) Completed</td>
<td>August 31 (of 3rd year) or 12 months prior to defense (whichever is earlier)</td>
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<td>________</td>
<td>Title, Scope and Procedure Form</td>
<td>Submit with Thesis Proposal</td>
<td>Graduate Student Administrator</td>
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<td>________</td>
<td>Annual update with Thesis Committee</td>
<td>Meet at least once every 12 months with committee members</td>
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<td>Paper #1 accepted</td>
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<td>PI and Graduate Student Administrator</td>
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<td>________</td>
<td>Paper #2 submitted/accepted</td>
<td></td>
<td>PI and Graduate Student Administrator</td>
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<td>Schedule thesis defense</td>
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<td>Director of Doctoral Studies &amp; Graduate Student Admin.</td>
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<td>Submit Thesis</td>
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<td>________</td>
<td>Thesis Defense</td>
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Please see Graduate School of Arts and Sciences website for procedures on Intent to Graduate and Dissertation submission. (http://graduateschool.wustl.edu/current_students)