



JOHNS HOPKINS
UNIVERSITY

Department of
Mechanical
Engineering

Ph.D.
Graduate Student
Advising Manual

2016-2017

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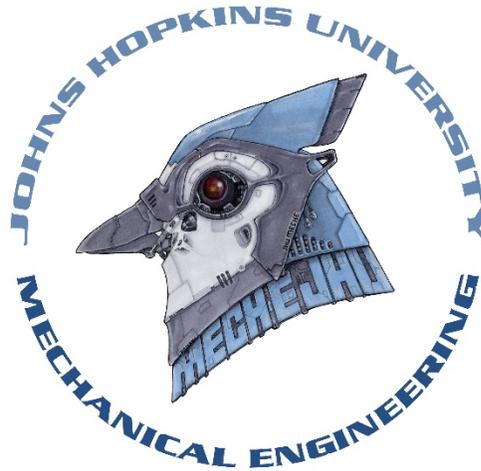


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1. Welcome!

Welcome to the Department of Mechanical Engineering! This manual is designed to serve as a guide for graduate students in the Department of Mechanical Engineering to work more effectively during the conduct of their research and to describe the basic academic requirements for both the MSE and Ph.D. degrees. The detailed planning of an academic program, such as choosing courses and the like must be done with the guidance of the faculty advisor.

This manual covers policies and procedures, and offers suggestions regarding our program. Please address issues and questions not covered in this manual with these professors and staff:

- Academic Program Manager - Mike Bernard
- Academic Program Coordinator - Kevin Adams
- Your faculty advisor
- Administrator - Marty Devaney
- Director of Graduate Studies, Professor Rajat Mittal
- Department Chair, Professor Gretar Tryggvason

This document is not phrased to professional legal standards. You will want to clarify any unclear issues with the department.

2. General Information

Graduate study is a joint enterprise involving faculty, fellow students, and instructors from other disciplines. Advanced degrees require advanced training through both coursework and individual faculty guidance as well as through innovative fundamental research. The results of this research should be disseminated through conference presentations, archival journals, and other appropriate publications. Our goal is to provide an environment that fosters a stimulating, rewarding, productive, and enjoyable intellectual enterprise.

2.1. Residency Requirements

Once students begin their graduate course of study toward a degree, they must complete a minimum of two consecutive semesters of registration as a full-time, resident graduate student. To qualify as a resident student, the student must be present on campus and working toward fulfilling the requirements for the degree. Complete information is available on the JHU Graduate Board's website at <http://homewoodgrad.jhu.edu/academics/graduate-board/>.

2.2. English Language Program for International Students

The English Language Program for International Teaching Assistants of the Language Teaching Center offers courses designed to make a student's graduate experience as effective and enjoyable as possible.

Enrollment in the course AS.370.602 Accent Reduction is **required** for all new international graduate students whose native language is not English, whose speaking score in the TOEFL is <27, and who wish to be considered for Teaching Assistant positions.

This remedial course and its optional subsequent course AS.370.603 Culture and Communication in American Academia will improve English language skills, teach American classroom culture, and offer pointers in teaching techniques. International graduate students cannot serve as a Teaching Assistant until AS.370.602 Accent Reduction is successfully completed.

2.3. Required Introductory Courses and Tutorials

There are three introductory courses and tutorials that most or all graduate students must take.

2.3.1. Responsible Conduct of Research

Many M.S.E. and all Ph.D. graduate students will be required to take the “Responsible Conduct of Research” course.

Each Ph.D. student must complete the in-person training course (AS.360.625) before the start of his or her fourth semester of the program. Failure to complete the course could result in the loss of funding.

Information is available at <http://engineering.jhu.edu/wse-research/resources-policies-forms/responsible-conduct-of-research/>.

2.3.2. Academic Ethics

Graduate students are automatically enrolled in the online tutorial EN.500.603 Academic Ethics, which teaches academic and ethical responsibilities. This 20-minute tutorial must be completed in the first eight weeks of the student’s first semester. The Whiting School of Engineering will notify new students when the course is available.

2.3.3. Research Laboratory Safety

All students working in a research laboratories and all Ph.D. students, whether working in a laboratory or not, should take the course EN.500.401 Research Laboratory Safety, an introduction to laboratory safety, including chemical, biological, radiation, and physical hazards. Students learn hazard assessment techniques, laboratory emergencies, and general lab standards for Whiting School of Engineering. The class will feature hands-on exercises with real-life experiments. This course should be taken before beginning work in a research laboratory.

2.4. Advisors

In most cases, a graduate student’s academic and research advisor will be a full-time professor in the Department of Mechanical Engineering.

Occasionally, a Ph.D. or M.S.E. student may partake in specialized research where he or she will work with a professor in another department. If this is the case, the student will have two advisors:

- A research advisor, whose primary appointment is in an outside department and may or may not have a secondary appointment in Mechanical Engineering
- An academic advisor whose primary appointment is in Mechanical Engineering.

2.5. Course Registration and Credits

2.5.1. Credits and Full-Time Status

Effective Fall 2016, all Whiting School of Engineering graduate students will register for courses with credits.

- The Mechanical Engineering degree requirements do not change for the number or types of courses.
- All Whiting School of Engineering (WSE) graduate-level courses (.EN.600-level or higher) have credits assigned to them.
- To maintain full-time status, all WSE graduate students must be enrolled in at least 9 credits. Students enrolled in fewer than 9 credits per semester will not meet the full-time enrollment requirement, which may affect residency requirements for all and visa concerns for international students.
- PhD students must enroll in at least 20 credits per semester. Students can achieve full-time status by registering for any combination of courses and seminars, as approved by one's advisor.
 - Seminars – 1 credit
 - WSE courses, both undergraduate and graduate – 3 or 4 credits
 - EN.530.801/EN.530.802 PhD Graduate Research – 3-20 credits
 - NOTE:
 - Audited courses do not count toward a full-time credit load.
 - Krieger School of Arts and Sciences' graduate-level courses will not have credits listed in ISIS, but will be recognized as 3-4 credits toward one's full-time credit load.
- Visit the Whiting School's Frequently Asked Questions page at <http://homewoodgrad.jhu.edu/academics/wse-graduate-credit-hours/> for more information.

2.5.2. Interdivisional Course Registration

Students may need to register in another division, like the Engineering for Professionals program or in any of Hopkins's eight other schools. Registration for courses in these areas must be done in person at the Registrar's office in Garland Hall. Visit

<https://studentaffairs.jhu.edu/registrar/students/interdivisional-registration/> for information.

2.6. Frequency of Course Offerings

Graduate courses are offered in specific semesters, and sometimes in alternating years. Below is a timeframe of elective course offerings listed in the anticipated order of next offering.

These offerings are subject to change due to instructor sabbaticals or unusual situations. Please confirm these offerings when planning your course schedule.

| MECHANICAL ENGINEERING - COURSES - ANTICIPATED OFFERINGS | | | | | |
|--|--|--|---|---|---|
| Semester | Mathematics / Energy | Robotics | Fluid Mechanics | Mechanics and Materials | Biomechanics |
| Fall 2017 (confirmed) | - EN.530.430 Applied Finite Element Analysis - EN.530.730 Finite Element Methods - EN.530.761 Math Methods for Engineers - EN.530.766 Numerical Methods | - EN.530.420 Robot Sensors and Actuators - EN.530.424 / 624 Dynamics of Robots and Spacecraft - EN.530.646 Robot Devices, Kinematics, Dynamics, and Control - EN.530.647 Adaptive Systems - EN.530.691 Haptic Interface Design for Human-Robot Interaction | - EN.530.418 Aerospace Structures and Materials - EN.530.621 Fluid Dynamics I - EN.530.625 Turbulence - EN.530.632 Convection | - EN.530.418 Aerospace Structures and Materials - EN.530.605 Mechanics of Solids and Materials I - EN.530.455 (undergrad) / EN.530.655 (grad) Additive Manufacturing | - EN.530.410 Biomechanics of the Cell - EN.530.445 Introduction to Biomechanics - EN.530.448 Biosolid Mechanics - EN.530.473 Molecular Spectroscopy and Imaging - EN.530.495 Microfabrication Laboratory - EN.530.633 Mechanics of the Biological Systems and Biophysical Methodologies |
| Spring 2018 (anticipated) | - EN.530.464/664 Energy Systems Analysis | - EN.530.421 Mechatronics - EN.530.649 System Identification - EN.530.653 or EN.530.654 Advanced Systems Modeling I or II - EN.530.486/686 Mechanics of Locomotion - EN.530.707 Robot System Programming | - EN.530.328 Fluid Mechanics II - EN.530.425 Mechanics of Flight - EN.530.426 Biofluid Mechanics - EN.530.432 Jet and Rocket Propulsion - EN.530.622 Fluid Dynamics II - EN.530.767 Computational Fluid Dynamics | - EN.530.381 Engineering Design Process - EN.530.606 Mechanics of Solids and Materials II - EN.530.681 TEM: Practice and Applications - EN.530.748 Stress Waves, Shocks, and Impacts | - EN.530.426 Biofluid Mechanics - EN.530.441 Intro to Biophotonics - EN.530.446 Experimental Biomechanics - EN.530.480 Image Processing and Data Visualization - EN.530.486 / EN.530.686 Mechanics of Locomotion - EN.530.628 Nonlinear Dynamics in Mechanics and Biology - EN.530.672 Biosensing and BioMEMS |

See next page for additional semesters...

| MECHANICAL ENGINEERING - COURSES - ANTICIPATED OFFERINGS | | | | | |
|--|--|--|--|---|--|
| Semester | Mathematics / Energy | Robotics | Fluid Mechanics | Mechanics and Materials | Biomechanics |
| Fall 2018 (anticipated) | - EN.530.430 Applied Finite Element Analysis -EN.530.761 Math Methods for Engineers | - EN.530.420 Robot Sensors and Actuators - EN.530.424 / EN.530.624 Dynamics of Robots and Spacecraft - EN.530.603 Applied Optimal Control - EN.530.646 Robot Devices, Kinematics, Dynamics, and Control | - EN.530.621 Fluid Dynamics I - EN.530.726 Hydrodynamic Stability - EN.530.766 Numerical Methods | - EN.530.405 Mechanics of Advanced Engineering Structures - EN.530.605 Mechanics of Solids and Materials I - EN.530.656 Mechanisms of Deformation and Fracture - EN.530.790 AFEM Multi-Scale | - EN.530.445 Intro to Biomechanics - EN.580.451 Cell and Tissue Engineering Laboratory - EN.530.473 Molecular Spectroscopy and Imaging - EN.530.495 Microfabrication Laboratory - EN.530.610 Statistical Mechanics in Biological Systems - EN.530.633 Mechanics of the Biological Systems and Biophysical Methodologies |
| Spring 2019 (anticipated) | - EN.530.464/664 Energy Systems Analysis | - EN.530.421 Mechatronics - EN.530.470 Space Vehicle Dynamics and Control - EN.530.486 / EN.530.686 Mechanics of Locomotion - EN.530.707 Robot Systems Programming | - EN.530.435 Guidance and Control of Flight Vehicles - EN.530.622 Fluid Dynamics II - EN.530.726 Hydrodynamic Stability - EN.530.767 Computational Fluid Dynamics | - EN.530.417 / EN.530.618 Fabricatology - EN.530.606 Mechanics of Solids and Materials II - EN.530.612 Computational Solid Mechanics - EN.530.618 Fabricatology | - EN.530.441 Intro to Biophotonics -EN.530.446 Experimental Biomechanics - EN.530.610 Statistical Mechanics in Biological Systems - EN.530.486 / EN.530.686 Mechanics of Locomotion |

Table 1 – Anticipated Course Frequencies

3. Ph.D. Degree Program

3.1. Degree Requirements

The Ph.D. degree certifies that the holder has demonstrated the ability to conduct independent research and develop new knowledge. The requirements for a Ph.D. in Mechanical Engineering are as follows:

Fulfill the University-wide requirements by:

- a) Completing a minimum of two consecutive semesters as a full-time resident graduate student,
- b) Passing the Graduate Board Oral examination (GBO), and...
- c) Submitting and defending a dissertation approved by at least three referees appointed by the Mechanical Engineering Department faculty.

In addition to the University-wide requirements, students must:

- a) Pass the Departmental Qualifying Examination (DQE) before the start of the fifth semester as a doctoral candidate. This examination is preliminary to the GBO and its primary purpose is to evaluate the candidate's suitability for continuing study.
- b) Act as Teaching Assistant to at least two Mechanical Engineering courses.
- c) For each semester that a student maintains full-time status (that is, not change to non-resident status), each student must register for and pass:
 - i. EN.530.801 (Fall) and EN.530.802 (Spring) Graduate Research.
 - ii. EN.530.803 (Fall) and EN.530.804 (Spring) Mechanical Engineering Seminar by attending the required number of presentations.
- d) Earn an appropriate grade for all classes taken (see Section 3.2).

3.1.1. Academic Performance Requirements

A course is satisfactorily completed if a "P" grade or a grade from A+ to B- is obtained. Grades of C+ or lower are evidence of unsatisfactory academic performance.

A student earning one C+, C, or C- grade will receive notification, with a copy to his or her advisor, of academic performance concerns and an explanation that a second C+, C, or C- or the student's first D or F grade will result in termination from the program.

A student receiving a termination notification can appeal to the Graduate Program chair by the official date by which "Incomplete" grades must be resolved for that semester, as established by the Registrar's Office. The chair, who may consult with the student and the student's advisor, is required to formulate a final written decision within two weeks after that date.

3.1.2. "Pass" Grade Not Accepted

Pass grades are not accepted for courses counting toward the Ph.D. degree unless a course is offered only on a Pass/Fail basis.

Deviations to this policy must be explicitly authorized in writing by the Mechanical Engineering student advisor before the official last day for dropping courses established by the Registrar's Office.

3.2. Ph.D. Departmental Qualifying Examination

The completion of a doctoral degree at a major research university requires a high level of academic sophistication in the candidate's field, as well as the ability to apply this advanced background in the creation of new knowledge. The Departmental Qualifying Examination (DQE) is an approximately one-hour oral examination in which students are tested in their principal research areas: fluid mechanics, mechanics and materials, biomechanics, or robotics, and also in applied mathematics.

The examination is given in late-January or by special arrangement with the Director of Graduate Studies, who in 2017-18 is Professor Rajat Mittal.

DQE Result Possibilities for Students Matriculating before Fall 2015

Effective for students who matriculated before Fall 2015 (i.e. Spring 2015 or earlier), the possible outcomes of the DQE are

- **Unconditional Pass** - no additional action is necessary
- **Conditions to be Met**
 - **Conditional Pass** - action must be taken to meet a condition by a specified deadline to convert to an unconditional pass
 - **Reexamination** - some or all portions of the exam must be repeated to pass it.
 - **Failure** - the complete exam must be repeated within six months of the initial exam date.

A Failure in the DQE retake is grounds for automatic dismissal from the Ph.D. program.

DQE Result Possibilities for Students Matriculating Fall 2015 or later

Effective for students matriculating Fall 2015 or later, the possible outcomes of the DQE are

- **Pass** - no additional action is necessary
- **Not Pass** - with one of the following three possibilities:
 - Conditions - which are to be met by a specified date
 - Partial Retake - required by a specified date
 - Full Retake - required by a specified date
- **Failure**

Conditions must be met or the retake must be passed to avoid a Failure, which is grounds for automatic dismissal from the Ph.D. program. Only one retake is allowed.

3.2.1. Fluid Mechanics and Heat Transfer

Students are presumed to be prepared for the Departmental Qualifying Examination on completion of courses EN.530.621 and EN.530.622 Fluid Dynamics I & II and EN.530.632 Convection, as well as possessing an undergraduate-level knowledge of thermodynamics, fluid mechanics and the application of fundamental concepts to technological problems.

In mathematics, students are required to have taken, or have the knowledge equivalent to EN.530.761 Applied Mathematics for Engineering.

3.2.2. Mechanics and Materials

In mathematics, students are required to have taken, or have the knowledge equivalent to EN.530.761 Mathematical Methods of Engineering I.

Students in this area typically follow either a mechanics-intensive track or a materials-intensive track.

Mechanics-intensive Track: Students are presumed to be prepared on completion of courses EN.530.605 Mechanics of Solids and Materials, and appropriate undergraduate courses in statics, dynamics, mechanics of materials, and vibrations. Depending on their research focus, students will also be examined on EN.530.730 Finite Element Analysis, EN.530.612 Computational Solid Mechanics, or EN.510.604 Mechanical Properties of Materials.

Materials-intensive Track: Students are presumed to be prepared on completion of courses EN.530.605 Mechanics of Solids and Materials, EN.510.601 Structure of Materials, EN.510.602 Thermodynamics and Kinetics of Materials, EN.510.604 Mechanical Properties of Materials, and appropriate undergraduate courses in statics, materials selection, and mechanics of materials.

3.2.3. Robotics

Students are presumed to be prepared on completion of EN.530.646 Robotics, Kinematics, Dynamics, and Control and at least three of the following courses as approved by the student's advisor:

Graduate Courses (at least 2 from this list)

- EN.530.603 Applied Optimal Control
- EN.530.616 (equivalent to EN.580.616/EN.520.601) Introduction to Linear Dynamical Systems
- EN.530.624 Dynamics of Robots and Spacecraft
- EN.530.639 Comparative Biomechanics (debut in Fall 2017)
- EN.530.645 Kinematics
- EN.530.649 System Identification
- EN.530.653 Advanced Systems Modeling
- EN.530.676 Locomotion in Mechanical and Biological Systems
- EN.530.678 Nonlinear Control and Planning in Robotics
- EN.530.686 Mechanics of Locomotion
- EN.530.707 Robot Systems Programming
- EN.530.761 Mathematical Methods for Engineers

Upper-level Undergraduate Courses (at most 1)

- EN.530.420 Robot Sensors/ Actuators
- EN.530.421 Mechatronics
- EN.530.470 Space Vehicle Dynamics and Control
- EN.530.485 Physics and Feedback in Living Systems

Graduate Courses Outside Mechanical Engineering (at most 1)

- EN.520.621 Introduction to Nonlinear Systems
- EN.600.636 (or EN.601.663 beginning Fall 2017)
Algorithms for Sensor-Based Robotics
- EN.600.661 (or EN.601.661 beginning Fall 2017) Computer Vision

Students should have proficiency in calculus, linear algebra, differential equations, linear systems, physics, statics, dynamical systems, vibrations, and strength of materials as appropriate for the conduct of their research.

In mathematics, students are required to use ordinary differential equations, linear algebra, and multidimensional calculus, as well as to perform frequency domain analysis. It is assumed that incoming students have knowledge equivalent to at least that of undergraduate third-year courses and will have taken two graduate-level mathematically intensive courses as agreed by the student's advisor.

Each student should select a course of study consistent with their research and approved by their advisor.

3.2.4. Biomechanics

Students in the biomechanics concentration are expected to take the departmental qualifying exam (DQE) after three semesters of graduate study. The student should demonstrate good knowledge in the areas of engineering mathematics, numerical/computational methods, mechanics and biological sciences.

To fulfill these requirements, the student must successfully complete at least six courses (at least two from the mathematics/numerical methods area and at least four from mechanics/biosciences area), or show knowledge equivalent to these courses:

1) *Engineering Mathematics*

EN.550.291 (or EN.553.291 beginning Fall 2017)

Linear Algebra and Differential Equations

EN.550.391 (or EN.553.391 beginning Fall 2017) Dynamical Systems

EN.550.426 (or EN.553.426 beginning Fall 2017) Introduction to Stochastic Processes

EN.530.761 Mathematical Methods of Engineering I

2) *Numerical and Computational Methods*

EN.530.612 Computational Solid Mechanics
EN.530.766 Numerical Methods

3) *Mechanics*

EN.530.605 Mechanics of Solids and Structures
EN.530.621/EN.530.622 Fluid Mechanics I and II
EN.530.633 Mechanics of the Biological Systems and Biophysical Methodologies
EN.530.671 Statistical Mechanics in Biological Systems
EN.530.672 BioMEMS and Biosensing

4) *Biological Science*

AS.020.306 Cell Biology
AS.020.380 Eukaryotic Molecular Biology
EN.530.410 Biomechanics of the Cell and Organisms
EN.530.441 Introduction to Biophotonics
EN.530.473 Molecular Spectroscopy and Imaging
EN.580.687/EN.580.688 Foundations of Computational Biology and Bioinformatics

This is not an exhaustive list. Other courses offered at the Homewood Campus, the Medical School, and the School of Public Health may be approved by your advisor.

NOTE: Some of these courses have prerequisites or require the permission of the instructor to take the course. Please consult the University's *Undergraduate and Graduate Programs* course catalog for further information.

3.3. Ph.D. Graduate Board Oral Examination

The Graduate Board Oral (GBO) examination is the University-wide “quality-control” check on our program. For all departments, the GBO exam has the following basic structure:

The two-hour examination is conducted by five faculty members: two Mechanical Engineering professors and three from outside the Department, who are selected by the Department Chair in consultation with the student’s advisor. One departmental alternate and one outside alternate are also required. The examination is chaired by the most senior of these outside members, usually a Professor. The examination chair has the right to set the scope of the exam.

The Mechanical Engineering Department frequently adheres to the following:

- a) Students normally take the GBO examination about a year after completion of their Departmental Qualifying Examination, usually during or after their sixth semester.

- b) Although there are no formal course requirements, students are presumed to be prepared for the GBO by studies equal to six graduate level (xxx.EN.600-xxx.799) courses in their field of specialization and six advanced (xxx.400-xxx.799) courses in related fields.
- c) The members of the GBO examining committee are nominated by the student's advisor and approved by the Department Chair.
- d) While it is usual for students to provide examiners with a brief synopsis of their research project two weeks before the examination, they are not usually asked to make a presentation on their research. The examination most frequently begins with questions from members of the department on any subject of their choosing.

Students take this examination very seriously and use it as an opportunity to synthesize the knowledge gained in the different courses they have taken. Each examination is different, but students are required to display significant depth in the areas related to their research and to demonstrate the ability to think and apply their advanced knowledge. Fundamental concepts, from sophomore-level mechanics to rigorous expressions of physical phenomena are all within the scope of the exam. General scaling laws, dimensional analysis, and basic physical principles (for example, conservation laws) are tools on which students may be asked to draw.

Candidates may be required to give formal definitions for concepts and terms germane to their research and to give numerical values of physical parameters with which they work. The usefulness and potential application of a student's research or field of study may also be examined.

Students preparing to take the GBO must contact Academic Program Coordinator Kevin Adams to make arrangements at least eight weeks prior to the intended exam date. The advisor and Department Chair will then select examiners and alternates. Eight weeks' notice will allow time to confirm availability of the proposed examiners and notify the Graduate Board by their notification deadlines.

3.4. Ph.D. Dissertation Defense

The final and principal requirement for the doctorate is a piece of original research worthy of publication. Candidates must write a dissertation describing their work in detail and pass a final oral examination which is essentially a defense of the dissertation.

Students should schedule their defense with the Academic Program Coordinator Kevin Adams and make arrangements necessary for the successful completion of their program.

Dissertation defense preparation steps are available in the "Preparing to Graduate" page at <https://me.jhu.edu/preparing-for-graduation/>.

3.4.1. International Students must visit the International Office

All international students must visit the International Office at least two months in advance of the defense date to ensure that their visa status and application for their EAD card and Optional Practical Training is in place.

3.4.2. Dissertation Readers

The University's Graduate Board requires two readers: your advisor and another JHU professor. The Mechanical Engineering department requires an additional reader for a total of three.

At least one of the three readers must be a full-time tenure-track Mechanical Engineering professor, whether that is your advisor or another professor. With the Department Chair's prior approval, the third reader can come from outside of Johns Hopkins University.

3.4.3. Submission and Printing of Dissertations

Ph.D. dissertations will be submitted only by electronic media. For information, contact David Reynolds, the Library ETC Coordinator at 410-516-7720 or dissertations@jhu.edu.

To celebrate degree accomplishments, the department will order bound and printed copies of dissertations for the student, his or her advisor and for the department library. The Academic Administrative staff will arrange for printing and shipping.

3.5. Academic Deadlines

Students preparing to complete a degree program in a given semester should see Mike Bernard to ensure that all necessary forms and requirements have been completed and submitted *prior* to the academic deadlines for the semester. The deadlines to submit all certification material are usually:

- Fall: late-October
- Winter: mid- to late-January
- Spring: late-March (PhD), early-May (MSE)
- Summer: late-July

Students who have not completed their requirements by the first day of classes must register for the current semester. Those who complete their requirements prior to the October deadline will receive a full tuition refund for the fall semester, including any non-resident status fees. Tuition paid from departmental funds or research grants will also be refunded.

Those who have completed their requirements in the summer or fall will receive an interim certificate from the registrar's office indicating that all requirements have been met, and notation will be made on their transcript. Additional information is available at <http://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/>.

4. Miscellaneous Academic Information

4.1. Graduate Student Annual Evaluations

The Whiting School of Engineering requires that once per academic year all full-time Homewood graduate programs carry out a written evaluation of all doctoral and master's students conducting thesis research. The evaluation process includes the opportunity for the advisor to initiate the student evaluation on his or her research and academic progress.

Mechanical Engineering Graduate Program Committee, with the support of the faculty and the Mechanical Engineering Graduate Student Association (MEGA) created a formal annual evaluation form, thinking it is good practice and a worthwhile investment. The evaluation form is in the back of this manual and at <http://me.jhu.edu/graduate-studies/academic-advising-graduate/>.

In December, advisors will initiate the evaluation process with their doctoral students and master's students conducting thesis research, who will be expected to complete the evaluation form and meet with their advisors to discuss progress and goals for the upcoming year. The student and advisor will both sign the evaluation, after which it will be delivered to the Academic Administrative staff before the first day of class in the Spring semester, usually the fourth Monday in January.

Note: For 2017, the submission due date will be extended to early-March and the due date for future years will likely revert to late-January.

4.2. Departmental Seminars

Part of the graduate experience is to become informed about and learn to evaluate the research done by others, both here at Johns Hopkins and at leading institutions worldwide.

SEMINAR REGISTRATION REQUIRED EVERY SEMESTER for Ph.D. STUDENTS!

Ph.D. students are required to register for and attend the EN.530.803 (Fall) and EN.530.804 (Spring) Mechanical Engineering Departmental Seminars, which occur every Thursday at 3:00p.m.

Registered students must attend a minimum of 8 seminars of the official Mechanical Engineering series, plus four other seminars, for a total of 12 per semester.

If a student has a scheduling conflict that interferes with his or her ability to attend a minimum of 8 official Mechanical Engineering graduate seminars, the student's advisor can approve attendance at alternate seminars, as long as the student attends 12 seminars in that semester.

There are also a number of special seminars in the department and regular seminars in other departments that may be of interest, such as Materials Science and Engineering, Earth and Planetary Sciences, and Biomedical Engineering; and Centers, such as CEAFM,

CAMCS, HEMI, and CISST. These seminars are beneficial, as it is common for GBO examiners to include questions addressed in such seminars.

4.3. Informal Student Seminars – Registration May be Required

In preparation for their thesis defense, students are required to present their work at informal seminars within the Department. Your advisor will explain the scope and expectations of your role as spectator and presenter in these presentations.

4.3.1. Fluids Seminars

The Fluids group holds student presentations on Fridays. All Fluids graduate students must register for this seminar using course numbers EN.530.807 in the Fall semester and EN.530.808 in the Spring semester.

4.3.2. Mechanics and Materials Seminars

The Mechanics and Solid Materials Student Seminar Series group meets Fridays at 12:00 noon. All Mechanics and Materials graduate students must register for this seminar using course numbers EN.530.809 in the Fall semester and EN.530.810 in the Spring semester.

4.3.3. Robotics Seminars

The Robotics group meets regularly at the discretion of the group. All Robotics graduate students must register for this seminar using course number EN.500.745 each semester.

As information is received, schedules will be sent to you in advance. Students are expected to attend these seminars, which provide an informal opportunity to learn about the ongoing research work of their colleagues.

4.4. Ethics

Unethical behavior can lead to a student's expulsion from the program. Graduate students are therefore expected to be aware of what actions constitute unethical behavior. For example, students must submit work that represents their own efforts. Whenever ideas or results are drawn from other sources, those sources must be cited in the submitted or presented work. **Unless otherwise explicitly permitted by the instructor for that course, students must not collaborate or discuss any assignments prior to submission of the work.** Students must be aware of and adhere to the ethical issues associated with the use of, and in particular the duplication of computer software and must abide by the rules of use set by the developer.

5. Masters Degree Program

The M.S.E. degree may be a final degree or it may be earned *en route* to the Ph.D. Either way, the requirements remain the same, and the advisor's approval is required. Students who complete the M.S.E. degree are not automatically admitted to the Ph.D. program. The requirements for an M.S.E. in Mechanical Engineering as described in Sections "A" and "B," must be met:

SECTION A: Satisfactory completion of eight one-semester advanced courses approved by your advisor, as follows:

- a) At least four courses must be at the graduate level (full-time programs xxx.EN.600 or higher, Engineering for Professionals xx5.4xx or higher).
- b) No more than four courses may be at the intermediate/advanced undergraduate level (full-time programs xxx.300 – xxx.499, Engineering for Professionals xx5.3xx).
- c) At least two courses should be in applied mathematics, numerical analysis, or computational methods. (This requirement can be waived in writing by your advisor, if sufficient prior preparation in these areas can be demonstrated).
- d) Independent Study, EN.530.EN.600 MSE Graduate Research, Graduate Research, or Special Studies are not eligible courses to help complete Section A's requirement.

SECTION B: In addition to the eight courses above, students must also complete either two more courses or a thesis:

- a) *Either* Two additional one-semester graduate courses (xxx.600–xxx.799) approved by your advisor, (for M.S.E. students only: one of these two courses can be EN.530.600 MSE Graduate Student Research), *or...*
- b) An M.S.E. essay (the official title of masters theses at Johns Hopkins) acceptable to your advisor and one other eligible reader.

At least half of all courses counted toward the master's degree must be EN.530.xxx Mechanical Engineering or EN.535.xxx Engineering for Professionals' Mechanical Engineering but no more than two courses may be chosen from the [Engineering for Professionals program](#).

If a thesis is going to be written, students must register for the course EN.530.602 Master's Thesis Research and Writing every semester that he or she works on master's thesis research and writing. This is separate from the Ph.D. dissertation.

This "Pass/Fail" course **does not** count as one of the eight courses required in addition to the thesis. The course is generally the equivalent of six credits and can be taken in one semester or split into three-credit courses taken over two semesters. If a student needs subsequent semesters to continue thesis work, he or she can simply register for the same course each semester.

COURSE LEVELS DEFINED

Subject to the degree requirement restrictions, one-semester advanced courses include:

Graduate

- Full-time program courses numbered xxx.6xx and higher (e.g. EN.530.621)
- Engineering for Professionals program courses numbered xx5.4xx and higher (e.g. 535.415).
- For courses taken before Fall 2017, some graduate courses in Computer Science numbers EN.600.4xx are considered graduate-level courses. Please contact the Computer Science department to confirm their graduate course offerings or visit <http://cs.jhu.edu>.

Undergraduate

- Full-time program courses numbered xxx.300-xxx.499
- Engineering for Professionals program courses numbered xx5.300-xx5.399.

5.1. Eligible MSE Essay Readers

While the University requires one reader for master's essays, departments are allowed to enforce stricter standards by requiring more than one reader. The Mechanical Engineering department requires two readers, the first one being the person (ordinarily a member of the Department's faculty) who supervised the student's project. The second reader is usually any duly appointed member of a department holding the rank of assistant professor or higher (excluding lecturers). The advisor will consult with the Department Chair if there are questions of eligibility for a proposed second reader, or if the proposed second reader is from outside Johns Hopkins University.

5.2. Required Mechanical Engineering Courses

At least half of the courses taken to complete the M.S.E. degree (not including those listed in section 2.3), including at least two .600- or .700-level courses, must be offered through the Mechanical Engineering department or the Engineering for Professionals Mechanical Engineering program, whose course numbers begin with EN.530.xxx and EN.535.xxx respectively.

5.3. Only One C-type Grade Can Count Toward the MSE

No more than one C grade (C+, C, or C-) can be counted toward the master's degree course requirements.

5.4. "Pass" Grade Not Accepted

Pass grades are not accepted for courses counting toward the Ph.D. degree unless a course is offered only on a Pass/Fail basis.

Deviations to this policy must be explicitly authorized in writing by the Mechanical Engineering student advisor before the official last day for dropping courses established by the Registrar's Office.

5.5. Double-Counting Courses

The Mechanical Engineering department double-counts courses using Whiting School of Engineering policy at <http://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/>.

5.6. Degree Completion Forms

Students who have completed the requirements for the M.S.E. degree should complete both the “Application for Graduation” and the “Certificate of Departmental Approval” forms.

Visit the “Preparing to Graduate” section of the Graduate Academic Advising page at <http://me.jhu.edu/graduate-studies/academic-advising-graduate/> for more information.

5.7. Degree Deadlines

The master’s degree completion deadlines are available at <http://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/>. Be sure to meet the deadlines when completing your degree and related applications to graduate.

5.8. Submission and Printing of Essays

Masters essays will be submitted only by electronic media. For information, contact David Reynolds, the Library ETC Coordinator at 410-516-7720 or dissertations@jhu.edu.

To celebrate degree accomplishments, the department will order bound and printed copies of essays for the student, his or her advisor and for the department library. The Academic Administrative staff will arrange for printing and shipping.

6. Part-Time vs. Non-Residency Status

6.1. Part-Time Status

Mechanical Engineering Ph.D. students may switch to part-time status after the successful completion of the Graduate Board Oral examination and the Teaching Assistant requirement, with approval of both the research advisor and the Graduate Program Chair, as well as the International Office for international students.

PART-TIME TUITION

Students are charged tuition per-credit, which in the 2016-17 academic year is \$1,680 per-credit. The student’s advisor or the department may choose to cover this charge, but that is not guaranteed.

COURSE REGISTRATION

Part-time students will take three credits of EN.530.801/802 Graduate Research each semester and some may continue to take the one-credit EN.530.803/804 Mechanical Engineering Graduate Seminar.

Once a student is on part-time status, the research advisor may excuse the student from the EN.530.803/804 Mechanical Engineering Graduate Seminar requirement. Part-time students or their advisors will pay the part-time per-credit tuition.

PART-TIME RESTRICTIONS

- Part-time students are ineligible to work as a student worker, including as a Teaching Assistant, and will not be eligible for graduate student salary.
- Part-time students enrolled in the University health insurance must pay the full premium, which in 2017-18 is \$940 per semester.

HOW TO OBTAIN PART-TIME STATUS

- Contact Academic Program Manager Mike Bernard to confirm eligibility to switch.
- Obtain approval from both the research advisor and the Graduate Program Chair
- International students must first obtain approval from the International Office.

RESOURCES

- Whiting School Graduate Credit Hours:
<http://homewoodgrad.jhu.edu/academics/wse-graduate-credit-hours/>

6.2. Non-Residency Status

Whiting School graduate students are eligible for non-residency status when all degree requirements except the writing of the dissertation are complete. The dissertation research must be finished before the non-resident status can be obtained.

Whiting School graduate students are typically granted only one semester of non-residency with the expectation that the dissertation will be written and prepared for defense in that semester. The dissertation defense can occur during that semester or shortly thereafter. The Whiting School will consider exception requests for an additional semester of non-residency.

NON-RESIDENT TUITION

Non-resident students pay only 10% of the full-time tuition but will still have all the privileges of full-time students such as access to campus services and faculty advising.

NON-RESIDENT RESTRICTIONS

Non-resident students cannot enroll in courses and would lose the Whiting School's financial support for health insurance. The department could choose to cover health insurance charges, but that is not guaranteed.

Non-resident students are automatically enrolled in health insurance, but can waive the insurance, if eligible for waiver by proof of enrollment in another health insurance plan with similar coverage.

To maintain non-resident status, students will have to register for non-resident status each semester and provide a letter explaining their progress toward the degree's completion.

HOW TO OBTAIN NON-RESIDENT STATUS

- Contact Academic Program Manager Mike Bernard to confirm eligibility for non-resident status.
- Complete the Non-Resident Status for Whiting School form, which Mike will send to the Whiting School Academic Affairs office for review and approval.
- If the Non-Resident request is denied, a student may be eligible for part-time status.

RESOURCES

- Graduate Residency and Registration Policies:
<http://homewoodgrad.jhu.edu/academics/graduate-board/new-grad-board-residency-page/>
- Graduate Board Forms, which include the Non-Resident Application and the Non-Resident Annual Report: <http://homewoodgrad.jhu.edu/academics/graduate-board/policies-and-forms/>
- Whiting School of Engineering Policy on Health Insurance page:
<http://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/>
(then select the Health Insurance tab)

7. Financial Aid

There are four sources of financial aid available to Mechanical Engineering students. First, Whiting School Graduate Student Tuition Fellowships cover 80% of a Ph.D. student's tuition. The second is provided by Teaching Assistant hourly positions. Next are Research Assistantships for students working on funded research projects. The fourth is through Departmental Fellowships.

7.1. Tuition Fellowships

At the Dean's discretion, tuition fellowships may be awarded to full-time students who are supported by the Department through either faculty research projects or fellowships. Ph.D. candidates may be eligible for 80% tuition fellowships.

7.2. Teaching Assistant

To assist in the teaching function of the Department, Teaching Assistant opportunities are provided to students who grade papers, conduct laboratories and hold office hours. TAs are remunerated for their efforts according to a formula that quantifies the number of hours required for a particular course, multiplied by an hourly rate, to be determined by the beginning of each semester.

7.3. Research Assistantships

Students working directly on funded research projects are paid by the faculty member's projects conducting that research. In the 2016-17 academic year Research Assistants are typically paid a salary of \$1,250.00 semi-monthly at an annual full-time rate of \$30,000. This rate may vary depending on the grant or funding agency.

Continuation of a Research Assistantship is determined by a student's performance and the availability of research funding. This support allows students to progress towards completion of their degrees, but also requires the completion of specific research accomplishments.

There are a few basic rules regarding the holding of a Research Assistantship.

- At least once weekly meetings with the student and faculty advisor are the norm, but vary from advisor to advisor.

- Both the Intersession in January and the summer, June through August are particularly important periods for research progress. Students are expected to make significant effort during these periods.
- Students should discuss any planned absences with their advisors.

7.4. Departmental Fellowships

Mechanical Engineering offers the Departmental Fellowship, provided to an outstanding first-year student to allow the opportunity to find an appropriate advisor and embark on research. The current fellowship award includes full tuition remission, health insurance, matriculation fee, a one-time \$2,000 admission bonus, and a stipend of \$1,250.00 semi-monthly at an annual full-time rate of \$30,000.

The one-time \$2,000 admission bonus will be paid in the first month of the Department Fellow's matriculation.

The Whiting School of Engineering maintains a website on additional external fellowships at <http://eng.jhu.edu/wse/page/external-fellowships> where a student can apply for additional financial aid.

7.5. Other Financial Aid

The Office of Student Financial Services has other financial aid sources available, even to those who current have full financial support, including research assistantships and some fellowships. Any enrolled or accepted graduate student who is a U.S. citizen, U.S. permanent resident, or eligible non-citizen may apply for federal and state financial aid. Sources of aid, eligibility requirements, applications, and other information are available at <http://engineering.jhu.edu/graduate-studies/graduate-financial-aid/>.

7.6. Student Employment

The Student Employment Services office offers opportunities for employment for many positions on the campus. They will help you determine your work eligibility. Should you wish to obtain additional employment, please speak with your advisor so you will be able to fulfill the obligations of your education and research. The Student Employment Services office is located in the basement of Garland Hall, and their website is located at <http://www.jhu.edu/stujob/>.

8. Administration

8.1. Department Offices

The Department Administrative Office is located in Latrobe 223. The office provides services and assistance to faculty, staff, graduate students, and undergraduate students. All purchasing, payroll, budget and accounting transactions, shipping, receiving, and other administrative services are handled through this office.

8.2. Supplies and Services

Most of the services you will need will be provided through the Department Office.

COPIER and SCANNER - Graduate students are welcome to use the department photocopier machine for tasks related to the conduct of research or the academic pursuits of the faculty. Informal training of use of the copier and its features is available.

FAX MACHINE - The number for the fax machine in Latrobe 223-A is 410-516-4316. Since many people rely on this machine, incoming faxes must be labeled or have a fax cover sheet. Students may use the outgoing fax for communication related to the conduct of research or the academic pursuits of the faculty.

This is how to dial a fax number for the following types of numbers:

- Local Number in the Baltimore area, with area codes 410 and 443:
Dial 9, the area code and telephone number; e.g. 9-410-555-3818.
- Long Distance numbers in Maryland (area codes 240, 301, some numbers in area codes 410 and 443), the United States, Canada, and Caribbean locations using a three-digit Area Code: *Dial 9, 1, the area code and telephone number; e.g. 9-1-717-555-8203.*
- Elsewhere: *Dial 9, 011, the country code and telephone number; e.g. 9-011-39-555241156.*

STUDENT MAILBOXES - All graduate students have a mailbox located in Latrobe 223. Mail is ordinarily distributed daily. It is important to check your mailboxes regularly. The administrative staff will help with questions regarding pickup, delivery, postage, and Express Mail services.

SHIPPING AND RECEIVING - FedEx regularly delivers to the Department Office. FedEx picks up on demand and delivers as required. Other carriers may be used in special circumstances.

An e-mail will be sent to you notifying you of any delivery that has arrived for you, which is stored in the receiving area in Latrobe 217. When picking up a package, sign and date the package log before taking your package. Outgoing shipments must be received in the Department Office before 2:00 p.m. As a convenience, personal items may be shipped and received through the Department Office, but the Department does not pay shipping fees for these. Please contact the administrative staff in Latrobe 223 with your questions.

OFFICE EQUIPMENT - Paper cutters, staplers, telephone books, and other items are available for general use. **These items must be kept in the Department Office.**

KITCHEN, including COFFEE and TEA SERVICE - A refrigerator and microwave oven are available to store and heat your meals. Please help keep the kitchen area clean. Coffee, tea, and hot chocolate are available at 50 cents per cup on the honor system. You may also pay \$10.00 per month for a one-cup-a-day supply.

8.3. Additional Services and Resources

The University offers a variety of services. These are among some that cater to graduate students:

- **Registrar** - <http://web.jhu.edu/registrar>
- **Parking and Transportation Services** - <http://ts.jhu.edu/>

- **Center for Social Concern** – service opportunities and advocate for social change - <http://csc.jhu.edu>
- **Campus Ministries** – for all faiths and those seeking spiritual growth - <http://web1.johnshopkins.edu/chaplain>
- **Counseling Center** – whenever we need a little extra help from our friends - <http://web.jhu.edu/counselingcenter>
- **JHU Gazette** – the University’s official news publication - <http://hub.jhu.edu/gazette>
- **Johns Hopkins Magazine** - <http://hub.jhu.edu/magazine>

9. Purchasing and Travel Reimbursements

9.1. Account Numbers are Necessary for Purchases

Account or “budget” numbers for research project expenditures are extremely important. Your advisor has a series of account numbers and will supply you with the account number to use for any purchases. Orders cannot be processed without this number, which is either a 9-digit “Internal Order” number for sponsored projects or a 10-digit “Cost Center” for non-sponsored accounts.

9.2. Ordering Equipment, Supplies, and Services

Orders for the purchase and acquisition of supplies, equipment and materials must be arranged with the Accounting Specialist. Orders must be received by 3:00 p.m. to allow the possibility of same-day ordering. Orders received after 3:00 p.m., in most cases, will be ordered the next business day.

Send your orders with the following information:

- The vendor’s name and contact information – include when possible the postal address, telephone number, e-mail address, and the vendor’s website address.
- Description of the item
- Part number
- Price or valid vendor quote
- The complete Internal Order or Cost Center number to be charged.
- Approval from your advisor or principal investigator, as necessary.
- Tag number for any “equipment” (see sections 6.2.1 and 6.2.2).

Do not send a “shopping cart” link or other link to the product, because the information on the link may change between the time you send the request and the time of the order.

9.2.1. Equipment Items

Equipment is defined as an article of non-expendable, tangible property having a useful life of more than one year and an acquisition cost of \$5,000 or more per unit. To order such equipment, three quotes from three vendors are necessary, or a sole source justification letter explaining why a specific vendor must supply the item must be provided.

9.2.2. Tag Numbers

The JHU Office of Cost Analysis is responsible for identifying, recording, and tagging equipment. Whenever possible, equipment items costing \$5,000 or more are tagged with a University property tag, using a tag which contains a bar-coded property identification number. Property tags are affixed to equipment by Cost Analysis staff in a standard, visible location on the equipment.

Never remove the Tag Number from your equipment! The bar-coded Tag Number labels are self-destructive. When removed, bar-coded labels leave a checkered design imprinted on the equipment and the tag cannot be reapplied.

9.2.3. Component Parts

Component parts are those that will be used to fabricate or build a piece of equipment. Parts to be used in the fabrication of an item of equipment are defined as “equipment” when the total cost is more than \$5,000.

Installation costs and freight charges are considered a part of the cost of equipment. They should be included in the total cost and charged to an equipment object code if the total cost is more than \$5,000.

9.2.4. Supply Items

Supply items are defined as articles which cost less than \$5,000 and/or have a useful life of less than one year.

9.2.5. Replacement Parts

Items purchased as replacement parts for a particular piece of equipment are considered supply items since they do not enhance the value of the piece of equipment.

9.3. Return of Merchandise Purchased with a Purchase Order

In the case where merchandise must be returned to the vendor because it is not suitable or other reason, a duplicate shipment was received, please observe the following procedures:

- It is your responsibility to contact the vendor to explain the reason for the return and request a Return Merchandise Authorization (RMA) Number. Ask the vendor if they will pay the return shipping charges, and if so, what procedure should be used to ship the merchandise. Often the vendor will send you a return-shipping label.
- Label the item with the vendor’s name and address; write the RMA Number clearly on the package next to the mailing label.
- Bring the package to the Department Office and notify our Accounting Specialist that the package is a return. Be sure to provide an account number to apply shipping charges.

9.4. Get a Tax Exempt Sales Certificate

JHU is a non-profit organization, and therefore, is exempt from paying sales tax. **If purchases are made with personal funds, sales tax will not be reimbursed to you.**

Purchasing equipment or materials with a personal credit card or with cash is not recommended, but if you absolutely need to do so, please obtain a copy of the tax-exempt sales certificate in the Department Office before making your purchase. Presenting this certificate at the time of purchase will eliminate sales tax from your bill, in most cases.

Visit http://ssc.jhmi.edu/supplychain/forms/jhu_forms/jhu_tax_exemption_cert.pdf to print a copy of the Tax Exempt Sales Certificate.

Note that some stores, e.g. Wal-Mart will require that you obtain an in-store tax exemption certificate in addition to the JHU tax exemption. Please check with the store before making purchases to ensure that you have all required documents.

9.5. Reimbursements

The Department office processes reimbursements for official travel and out-of-pocket expenses for the purchase of materials and supplies.

Reimbursements may be obtained in one of two ways:

- Up to \$100.00: from the Petty Cash Office in Garland Hall using a Petty Cash Voucher.
- Over \$100.00: Check requested from and paid through the Accounts Payable Office. Please allow up to three weeks for the reimbursement to be processed.

9.6. Travel

9.6.1. Preferred Vendor: World Travel Services

World Travel Services (WTS) is a preferred vendor for travel arrangements. They will send invoices instead of requiring a credit card up front, so your credit line will not be accessed or held while waiting for reimbursement or payments. Info is available at www.worldtravelservice.com and e-mail jhuttravel@worldtravelservice.com.

9.6.2. Travel Expense Reimbursements

Reimbursement for travel expenses must be submitted with a completed and signed Travel Expense Report and will be processed and forwarded to the Accounts Payable Office. Allow two to three weeks for the reimbursement to be processed. Travel Expense Report forms can be obtained from the staff in the office.

It is the student's responsibility to complete the form and attach the necessary original receipts, obtain a signature approval, and account number from the Principal Investigator. In 2014, business mileage is reimbursed at 56 cents per mile.

9.6.3. Reimbursements for Air Travel

To reimburse air travel costs, you will need a credit card statement reflecting the cost of the ticket, along with payment confirmation from the airline. For upgrade, luggage, or other additional charges, a receipt is required. A flight itinerary from the airline will not be accepted because proof of payment is not indicated.

9.6.4. International Air Travel and the Fly America Act

The Fly America Act should be followed when foreign travel is required. Federal regulations require that individuals whose travel is supported by federal funds use American flag carrier airlines. Most sponsored accounts have federal fund sources. If you have questions, please see our Accounting Specialist before arranging air travel.

9.6.5. Automobile Insurance

JHU carries automobile insurance coverage; therefore, if you rent a car that is used for University business, DO NOT purchase additional insurance coverage. You will not be reimbursed for that purchase.

10. Payroll

Paychecks are distributed semi-monthly, on the 15th and the last day of the month. If payday falls on a weekend or holiday, paychecks are distributed the last regular working day preceding the payday. Checks will be placed in your mailbox.

- Direct Deposit to your account is available; visit <https://orchid.hosts.jhmi.edu/stujob/seiform/directDeposit.pdf>.
- Cancel direct deposit at https://orchid.hosts.jhmi.edu/stujob/seiform/dd_Cancellation_form.pdf.

10.1. Salaries – Research Assistantships

The department determines the salaries for Research Assistantships. Other financial assistance, criteria of the grant or contract on which you are performing research may cause your salary to vary from those of your colleagues. Research Assistants are paid from the research funds of their particular advisor.

Salaries are subject to Federal and State tax withholding, which is done automatically through the Payroll Office and will be reflected on the pay stub. Students will want to complete a W-4 Federal Tax withholding form and a MW-507 Maryland State withholding form and return them to the Student Employment Services office in the basement of Garland Hall.

10.2. Stipends - Fellowships

Stipends are paid to those students on Departmental or other Fellowships.

***NOTE: Stipends usually have no income tax withheld.
Students on fellowships are responsible to file and pay income taxes.***

Students receiving stipends may have to file quarterly withholding reports with the Internal Revenue Service. For information contact the Tax Office at http://finance.jhu.edu/depts/tax/about_tax.html, 443-997-8442, or tax@jhu.edu.

11. Safety and Security

11.1. Laboratory Safety

Lab Safety is the responsibility of all who use, maintain, or visit the labs within the Mechanical Engineering department. Laboratory researchers are responsible for working with the principal investigator to become familiar with the appropriate hazard information and safety policies before performing any work.

The JHU Department of Health, Safety and Environment maintains a website to ensure updated information on policies, issues, and concerns are available to all. Visit <http://www.hopkinsmedicine.org/hse> to view directives concerning Safety Responsibilities and Policies, Environmental Monitoring, Fire Safety, Chemical Safety, Laboratory Safety, and Radiation Safety.

Also, visit the Homewood Campus Laboratory Safety page at <http://labsafety.jhu.edu/> for important information.

For each lab, a Principal Investigator (PI) is assigned. That person is responsible for the safe operation of the lab, training on all chemicals in the work area, the training of the persons on the equipment within the lab, and is a ready source to answer any questions on a specific lab with regards to its operation and all safety aspects. The PI's for each lab are listed on the entrance door to each lab.

11.2. Campus Security

While the Hopkins Security Department provides ample and appropriate security to the campus, they remind us that we must play our part. Please exercise common sense when entering and leaving your office, classrooms, and labs.

- When you leave your office, if you are the only one there, lock the doors even if you leave only for a minute! Thefts take only a few seconds and valuable equipment and your work can disappear instantly.
- Secure your computers, especially laptops! Take your laptops with you when you leave your office.
- Back up your work onto separate disks or systems in case something happens to computer via virus, equipment problems, or theft. The University provides free anti-virus software that can be downloaded from the website at <http://it.jhu.edu/alerts/>.
- Secure your laptop cases or any bag that might be mistaken for a computer bag.
- Lock your car and don't leave any items inside your car in plain sight. Secure them in your trunk or bring them with you.

- Secure your personal items such as your purse, wallet, books, equipment, and your coat or jacket.
- If you see someone suspicious in your lab or office, don't confront the individual, contact Security at 410-516-7777 right away. Your personal safety is most important.
- If you are uncomfortable walking through campus or to your car at night or otherwise are concerned for your safety, the Security department provides escort services to selected locations. Call 410-516-8700 to arrange for an escort.

12. Facilities

12.1. Graduate Student Offices

As space provides, full-time Ph.D. graduate students are provided with a desk in a group office. In consultation with the faculty Space Committee, the department assigns the desks. *The department does not furnish computers or other desk supplies.*

The department will provide you with your office assignment, as well as arrange to issue you keys. A \$5 deposit is charged for each key issued, which will be returned to you when you return the keys.

12.2. Libraries

The Milton S. Eisenhower Library offers a variety of online, research, and book lending services, which are outlined at <http://library.jhu.edu>.

The Library also purchases books and journals based on departmental requests. Student requests for books and journals should be discussed with their advisor who may communicate the request to the faculty member designated as the Library Liaison, currently Professor Jaafar El-Awady, who is located at Latrobe 123, and can be contacted at jelawady@jhu.edu or 410-516-6683.

12.3. WSE Manufacturing

The WSE Manufacturing student machine shop is located in the basement of the Wyman Park Building, and is open to students, faculty, and staff across the Johns Hopkins University. An orientation regarding shop safety, shop rules, and equipment operations is required to be allowed to work in the student machine shop.

To learn more about the WSE Manufacturing equipment and services available to students, please visit their website at <http://engineering.jhu.edu/wse-research/wse-manufacturing/>.

12.4. Computing

There are a cornucopia of computing facilities and services available to the Johns Hopkins community. The Information Technology website at <http://it.jhu.edu> offers an

overview of the IT Organization, its projects and services, support for applications and general questions, and news about emerging technologies and strategic imperatives, as well as e-mail, web, and file sharing services.

12.4.1. JHU Information Technology

Information Technology at Johns Hopkins is the online resource for IT-related information. Their primary focus is to support the missions of the Johns Hopkins Institutions and provide technology solutions for faculty, staff, patients, and students in support of teaching, research, and patient care.

This Web site serves as a repository for all IT-related information at Johns Hopkins. You will find a lot of useful information within this site, including an overview of the IT Organization, its projects and services, support for applications and general questions, and news about emerging technologies and strategic imperatives.

12.4.2. WSE Information Technology

WSE IT is tasked with supporting the IT needs of the Whiting community. They are a component of the WSE Dean's office, and not a branch of IT@JH. Please visit their website at <http://wseit.engineering.jhu.edu/> to learn how WSE IT can serve you.

12.4.3. Software Downloads

The university owns licenses to many software packages, many of which may be downloaded from the WSE IT website. Please visit <http://wseit.engineering.jhu.edu/software-downloads/> to learn more.

12.4.4. Academic Computer Lab - Krieger Hall

The Academic Computer lab, which offers a wide variety of Mac and Windows operating systems loaded with all kinds of software: Matlab, Mathematica, Microsoft Office, Adobe products and more are available in 160 Krieger Hall. Information is available at <http://web1.johnshopkins.edu/classrooms/kriegerlab/>.

13. Student Disability Services

The Office of Student Disability Services (SDS) assists full-time undergraduate and graduate students in the Krieger School of Arts and Sciences and the Whiting School of Engineering with disability concerns, in compliance with the provisions of the Americans with Disabilities Act of 1990 (ADA) and Section 504 of the Rehabilitation Act of 1973. SDS assists the University community in understanding the effects of disabilities and in eliminating the physical, technical, attitudinal and programmatic barriers that limit the range of opportunities for students with disabilities, as well as provides individuals with reasonable accommodations. The SDS maintains and protects the confidentiality of individual records as required by law.

For additional information and to access the services of the SDS office, please visit <http://web.jhu.edu/disabilities/index.html>, contact them at 410-516-4720 or studentdisabilityservices@jhu.edu, or visit their office in 385 Garland Hall.

14. Groups and Activities

14.1. Mechanical Engineering Graduate Student Association (MEGA)

MEGA is a social and advocacy organization for the graduate students of Mechanical Engineering. As a graduate student, you will be invited to various events throughout the year. For information, contact MEGA president Debjoy Mallick at jhumega@gmail.com.

14.2. University and Departmental Graduate Student Representation

Each year the graduate students elect a full-time Ph.D. student to serve as a departmental representative to the University's Graduate Representative Organization. The GRO, whose website is <http://gro.jhu.edu>, is an advocacy group for all graduate students. The GRO serves the student body as a liaison to the University's schools, administration, and dean's offices as well as hosts social activities and provides extensive information about life on campus and in and around Baltimore.

Each department sends a graduate student representative to serve in the GRO, and an announcement is made each year as to who will represent the department. You are welcome to forward to the representative your questions and concerns, which will be presented at GRO meetings.

14.3. American Society of Mechanical Engineers (ASME)

Visit the ASME Faculty Advisor, Dr. Steven Marra for information and application materials. Information about ASME can be found at <http://www.asme.org/>.

14.4. American Institute of Aeronautics and Astronautics (AIAA)

The Baltimore section of AIAA has an active branch on campus. Information is available at <http://www.aiaa.org>. For information, contact Dr. Kerri Phillips at Kerri.Phillips@jhuapl.edu.

14.5. Extracurricular Activities

As a department, Mechanical Engineering participates in University intramural athletics. Mechanical Engineering has and will continue to field strong teams in softball, and periodically participates in basketball, volleyball, and other sports.

Periodically, students, staff, and faculty will host social events off-campus. You will be notified of these events as the department hears of them. If you want to host a social event, notify Mike Bernard, who will announce it to the Mechanical Engineering community.

Many groups and organizations throughout the University provide ample opportunities for social times and fun. Check out these websites for information:

14.5.1. Johns Hopkins University

- **Campus Life** - http://webapps.jhu.edu/jhuniverse/campus_life/
- **Student Life** - <http://web.jhu.edu/studentlife>
- **Arts and Culture** - http://web.jhu.edu/studentlife/homewood_arts/student_arts.html
- **Recreation Center** – grad students have free membership - <http://web.jhu.edu/recreation>.
- **Hopkins Athletics** - <http://www.hopkinssports.com/>

14.5.2. In the Baltimore Area

- **Baltimore Collegetown** – things to do and resources for college students - <http://baltimorecollegetown.org/>
- **Baltimore Area Convention and Visitors Association** - <http://baltimore.org/>
- **Baltimore Office of Promotion and the Arts** - <http://www.bop.org/>

15. Notice of Non-Discriminatory Policy

The Johns Hopkins University admits students of any race, color, sex, religion, national or ethnic origin, handicap or veteran status to all of the rights, privileges, programs, benefits and activities generally accorded or made available to students at the University. It does not discriminate on the basis of race, color, sex, religion, sexual orientation, national or ethnic origin, handicap or veteran status in any program or activity, including the administration of its educational policies, admission policies, scholarship and loan programs, and athletic and other University-administered programs. Accordingly, the University does not take into consideration personal factors that are irrelevant to the program involved.

Questions regarding access to programs following Title VI, Title IX, and Section 504 should be referred to the Affirmative Action Officer, 205 Garland Hall, 410-516-8075.

16. Appendices

Please see the next page for appendices.



Department of Mechanical Engineering, Johns Hopkins University
Graduate Student Evaluation Form

Name: _____

Calendar Year: _____

Part 1 - to the student: This form is intended to summarize your accomplishments in the past year and indicate your plans for the coming year. Please complete, sign, and discuss this with your advisor. Your advisor will also sign it and see to it that it is placed in your student file. Continue on as many sheets as necessary.

Responsible Conduct of Research course completed? No Yes (When? _____)

- COURSES COMPLETED IN THE PAST 2 SEMESTERS:

- PLANNED COURSES FOR THE NEXT 2 SEMESTERS:

- TEACHING ASSISTANT REQUIREMENTS:

- PAPERS SUBMITTED OR PUBLISHED:

- CONFERENCE AND INTERNAL/INFORMAL PRESENTATIONS:

- MAJOR RESEARCH ACCOMPLISHMENTS:

- RESEARCH, ACADEMIC, AND OTHER GOALS IN THE COMING YEAR (advisor must agree):

- YOUR COMMENTS:

- ADVISOR'S COMMENTS:

I have reviewed this document with my advisor and I have seen his/her comments

Student signature _____ Date _____

Advisor signature _____ Date _____

Part 2 - to the advisor: This form is intended to guide a discussion with your student about their accomplishments, progress, and areas for improvement. This discussion is an opportunity to evaluate the student/advisor relationship and create a more effective research partnership. Below are several topics that should be covered in the discussion. Please think about these issues before meeting with the student. Space is provided for notes. **Both you and the student will sign this form.**

- Research** (discuss as applicable: thesis topic, future publications, ability to conduct quality research, ability to think of and discuss new ideas, overall progress)
Comments:

- Professionalism** (discuss as applicable: conduct, presentation skills, writing skills, communication skills, teamwork)
Comments:

- Logistics** (discuss as applicable: graduation timeframe, future state of student funding, specific grant requirements, present funding, progress towards students post-graduate goals)
Comments:

- Educational Progress** (discuss as applicable: academic progress, progress towards DQE or GBO, teaching opportunities, TA opportunities)
Comments:

- Other** (discuss as applicable) – Unaddressed student or advisor concerns
 - Importance of research with respect to greater research community
 - Students impressions of their progress
 - _____
 - _____

Student signature _____

Date _____

Advisor signature _____

Date _____

| | | |
|---|--|--|
|  | Certificate of Departmental Approval Master of Science in Engineering Degree Department of Mechanical Engineering | |
| | Name | |
| | Hopkins ID# | |
| | Faculty Advisor | |
| | Semester of Graduation | |
| | Last Semester Registered | |

Requirement #1a: Academic Ethics course

- 500.403 Academic Ethics - completion date: _____

Requirement #1b: Research and Laboratory Safety courses – only for master’s students conducting research

Either:

- 500.401 Research Laboratory Safety Course (or equivalent) - completion date: _____
- 360.624 or 360.625 Responsible Conduct of Research Course completion date: _____

Or:

- I conducted no research for the master’s degree.

Requirement #2: Ten one-semester courses approved by faculty advisor

| Course Number | Course Title | Math Course? | Semester | Grade | Double Counted from JHU BS? |
|---------------|--------------|--------------|----------|-------|-----------------------------|
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Notes: A course is satisfactorily completed if a grade from A+ to B- is obtained. Grades of C+ or lower are evidence of unsatisfactory academic performance. If necessary, one course with a C+, C, or C- final grade can be counted toward this degree. Students who matriculated before Fall 2014 may use a P (Pass) grade for a course, with advisor approval. Pass grades are not accepted for students matriculating in Fall 2014 or later.

- At least two courses should be in applied mathematics, numerical analysis or computational methods (this requirement can be waived in writing by the advisor if sufficient preparation in these areas can be demonstrated).
- These courses cannot include Independent Study, Graduate Research, MSE Research, Seminar, or Special Studies courses.
- At least half of the courses must be 530.xxx Mechanical Engineering or 535.xxx Engineering for Professionals’ Mechanical Engineering but no more than two courses may be chosen from the Engineering for Professionals Program.
- At least six courses must be at the graduate level (full time xxx.600 or higher, Engineering for Professionals [EP] xx5.4xx or higher).
- One course can be 530.600 MSE Graduate Research.
- No more than four courses may be at the intermediate/advanced undergraduate level (full-time xxx.300-xxx.499 or EP xx5.3xx).
- Upon completion and submission of the essay / thesis, a copy of the library Commercial Binding Office receipt must be delivered to the Whiting School of Engineering’s Academic Affairs office.

Advisor’s Certification

This is to certify that this student has satisfied all of the academic requirements for the Master of Science in Engineering Degree in the Department of Mechanical Engineering.

Advisor’s Signature

Date

| | | |
|---|--|--|
|  | Certificate of Departmental Approval Master of Science in Engineering Degree Department of Mechanical Engineering | |
| | Name | |
| | Hopkins ID# | |
| | Faculty Advisor | |
| | Semester of Graduation | |
| | Last Semester Registered | |

Requirement #1: Academic Ethics, Responsible Conduct of Research, Laboratory Safety courses

- 500.403 Academic Ethics - completion date: _____
- 360.624 or 360.625 Responsible Conduct of Research - completion date: _____
- 500.401 Research Laboratory Safety (or equivalent) - completion date: _____

Requirement #2a: Eight one-semester courses approved by faculty advisor

| Course Number | Course Title | Math Course? | Semester | Grade | Double Counted from JHU BS? |
|---------------|--------------|--------------|----------|-------|-----------------------------|
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Requirement #2b: Completion of a research project and master’s essay, approved by faculty advisor

Essay Title: _____

Submitted to the Library? No Yes **Date Submitted, if Yes:** _____

Notes: A course is satisfactorily completed if a grade from A+ to B- is obtained. Grades of C+ or lower are evidence of unsatisfactory academic performance. If necessary, one course with a C+, C, or C- final grade can be counted toward this degree. Students who matriculated before Fall 2014 may use a P (Pass) grade for a course, with advisor approval. Pass grades are not accepted for students matriculating in Fall 2014 or later.

- At least two courses should be in applied mathematics, numerical analysis or computational methods (this requirement can be waived in writing by the advisor if sufficient preparation in these areas can be demonstrated).
- These courses cannot include Independent Study, Graduate Research, MSE Research, Seminar, or Special Studies courses.
- At least half of the courses must be 530.xxx Mechanical Engineering or 535.xxx Engineering for Professionals’ Mechanical Engineering but no more than two courses may be chosen from the Engineering for Professionals Program.
- At least six courses must be at the graduate level (full time xxx.600 or higher, Engineering for Professionals [EP] xx5.4xx or higher)
- No more than four courses may be at the intermediate/advanced undergraduate level (full-time xxx.300-xxx.499 or EP xx5.3xx).
- Upon completion and submission of the essay / thesis, a copy of the library Commercial Binding Office receipt must be delivered to the Whiting School of Engineering’s Academic Affairs office.

Advisor’s Certification

This is to certify that this student has satisfied all of the academic requirements for the Master of Science in Engineering Degree in the Department of Mechanical Engineering.

Advisor’s Signature

Date



Graduate Board Oral Examination for Ph.D. Degree

Student: _____ 6-digit Student Hopkins ID: _____ Advisor: _____

***This form must be completed by the student's academic advisor.** The Mechanical Engineering staff must receive this completed form eight weeks in advance of the earliest proposed date of the GBO to help ensure that the examiners and alternates will be available on at least one of the dates.*

1. Please give choices of examination dates and periods.

| Choice | Date | Preference |
|--------|------|---|
| 1st | | <input type="checkbox"/> morning <input type="checkbox"/> afternoon <input type="checkbox"/> either |
| 2nd | | <input type="checkbox"/> morning <input type="checkbox"/> afternoon <input type="checkbox"/> either |
| 3rd | | <input type="checkbox"/> morning <input type="checkbox"/> afternoon <input type="checkbox"/> either |
| 4th | | <input type="checkbox"/> morning <input type="checkbox"/> afternoon <input type="checkbox"/> either |
| 5th | | <input type="checkbox"/> morning <input type="checkbox"/> afternoon <input type="checkbox"/> either |
| 6th | | <input type="checkbox"/> morning <input type="checkbox"/> afternoon <input type="checkbox"/> either |

You, as the advisor and four others will be on the Examination Committee. GBO Examination Committees must have two examiners whose primary faculty appointment is with the Mechanical Engineering department and three examiners whose primary faculty appointments are from other departments. One Alternate Examiner from the Mechanical Engineering department and one from another department must also be chosen.

You MUST contact each prospective examiner to enquire about their interest in, and availability to be an examiner for this GBO before submitting this form. Do not allow or require students to contact potential examiners and alternates!

Faculty with the following primary appointment titles are eligible to serve on GBO Examination Committees: Assistant Professor, Associate Professor, Professor, Assistant Research Professor, Associate Research Professor, Research Professor, Academy Professor, Emeritus Professor.

Faculty with other appointment titles are generally **ineligible** to serve on GBO Examination Committees, and require prior approval of the Graduate Board. Lecturers, Senior Lecturers, Associate Teaching Professors, and Teaching Professors are **ineligible** to serve on GBO Examination Committees.

A complete list of academic titles and their eligibility to serve on GBO Examination Committees is provided in a table in the document "Description of Academic Titles" available on the [Homewood Academic Council website](#).

EXAMINERS and ALTERNATES:

A. In addition to yourself, list the names in order of preference three or more Mechanical Engineering professors who you prefer to be the primary examiners or alternate examiners.

| Choice | Professor's Name | Professor's Rank | Professor's E-mail |
|---------------------------|------------------|------------------|--------------------|
| 1 st - Advisor | | | |
| 2nd | | | |
| 3rd | | | |
| 4th | | | |
| 5th | | | |

B. List the names, in order of preference at least four and up to 10 professors from other departments, any of whom you would like to be the primary examiners or alternate examiners.

| Choice | Professor's Name | Professor's Rank | Professor's E-mail |
|--------|------------------|------------------|--------------------|
| 1st | | | |
| 2nd | | | |
| 3rd | | | |
| 4th | | | |
| 5th | | | |
| 6th | | | |
| 7th | | | |
| 8th | | | |
| 9th | | | |
| 10th | | | |

Please note any equipment needs or special circumstances:

Please sign this form. By this signature, you, the advisor, certify that examiner choices were made by the Department Chair or Graduate Program Chair, per the Graduate Board Oral Exams policy at <http://homewoodgrad.jhu.edu/academics/graduate-board/graduate-board-oral-exams/>.

Advisor's Signature _____ Date _____

Date Received by Mechanical Engineering staff: _____

Received by: _____