



JOHNS HOPKINS
UNIVERSITY

Department of
Mechanical
Engineering

M.S.E.
Graduate Student
Advising Manual

2019-2020

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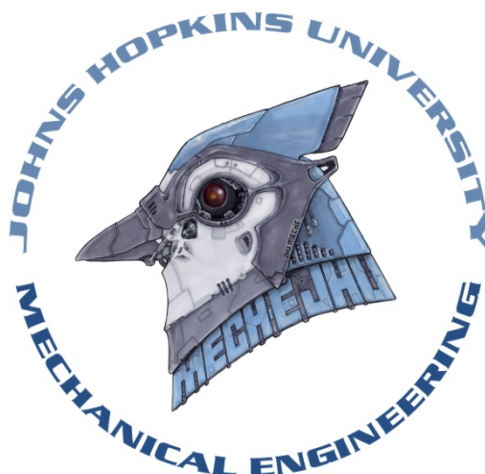


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1. Welcome!

Welcome to the Department of Mechanical Engineering! This manual is designed to serve as a guide for Master of Science in Engineering (M.S.E.) students in the Department of Mechanical Engineering to work more effectively during their time at JHU, and to describe the basic academic requirements for the M.S.E. degree. 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 – me-academic@jhu.edu
- Senior Academic Program Coordinator - Kevin Adams – me-academic@jhu.edu
- Your faculty advisor
- Administrator - Marty Devaney – mdevane2@jhu.edu
- Director of Graduate Studies, Professor Rajat Mittal – mittal@jhu.edu
- Diversity Champion, Professor Vicky Nguyen – vicky.nguyen@jhu.edu
- Department Head, Professor Gretar Tryggvason – gtryggv1@jhu.edu

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

2. General Information

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. Information is available at <http://homewoodgrad.jhu.edu/academics/graduate-board/>.

2.2. English Language Program for International Students

International students whose native language is other than English are strongly encouraged to strengthen their English language skills, no matter how proficient they are currently. Taking the course AS.370.602 Accent Reduction will help.

- **All students whose TOEFL speaking scores are 27/30 or higher** are exempt from taking AS.370.602 Accent Reduction, but are strongly encouraged to take AS.370.603 Communication Strategies in the American Academia.
- **For Masters students whose TOEFL speaking scores are 26/30 or lower:**
 - Those intending to apply for Mechanical Engineering Teaching Assistant (TA) positions must register for and complete AS.370.602 Accent Reduction before applying, and are strongly encouraged to take AS.370.603 Culture and Communication Strategies in the American Academia, as well.

- All others not intending to apply for a TA position are encouraged, but not required to register for AS.370.602 Accent Reduction and are welcome to take AS.370.603 Culture and Communication Strategies in the American Academia.

If you feel that your English-language skills are strong enough to avoid taking these remedial courses, you are welcome to participate in English-language assessments by the English Language Program for International Teaching Assistants of the Language Teaching Center (LTC)

Visit the LTC in 523 Krieger Hall to take the English-language assessment listening test and interview. Contact the [Center for Language Education](#) to arrange an appointment.

If you pass the test, you may drop the Accent Reduction course and you will be eligible to act as a Teaching Assistant right away. If the examiner “recommends” or “requires” taking AS.370.602 Accent Reduction, then our department requires you to take the course.

If you must take AS.370.602 Accent Reduction but there is a conflict with another course on your schedule, you may delay taking the course but you cannot be hired as a Teaching Assistant until you take and pass the remedial course.

2.3. Required Introductory Courses and Tutorials

There are three introductory courses and tutorials that all graduate students must take. These courses cannot be counted toward course requirements listed for the M.S.E. degree.

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.

- M.S.E. students receiving payment for research or who are conducting research used to help complete degree requirements must first complete the online training course (AS.360.624) before conducting research and receiving payment.
- M.S.E. students receiving payment from NIH Training Grants must take the in-person training course (AS.360.625).
- Each Ph.D. student must complete take 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 normally 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 must take the Research Laboratory Safety course modules: 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.

See Section 6.1.1 of this manual for details on the modules and lectures. These should be taken before beginning work in a research laboratory.

2.3.4. Opioid Epidemic Awareness and Title IX & Harassment Prevention

As part of online student orientation activities, you will take the online courses “Opioid Epidemic Awareness” and “Title IX & Harassment Prevention.”

These courses are available in [your My.JHU.edu](#) page under “My Learning” and search the catalog for “Opioid Epidemic Awareness” and “Title IX Harassment Prevention.” Sign in to “My.JHU.edu” with your JHED ID and password.

2.4. Advisors

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

DEFINITION

An advisor is best defined as a departmentally approved faculty member under whose guidance a student is conducting research and in whose lab the student is associated and expected to participate. All students must have an advisor.

ONE or MULTIPLE ADVISORS

Occasionally, a 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.

IF YOU HAVE A CONCERN ABOUT YOUR ADVISOR

If you have a concern about your advisor – whether you have concerns about advising quality, if you believe you and your advisor are not a good match, or if there is an unresolvable conflict – please contact the following people in this order:

1. Prof. Rajat Mittal, Director of Graduate Studies – mittal@jhu.edu
2. Mike Bernard, Academic Program Manager – me-academic@jhu.edu
3. Christine Kavanagh, Assistant Dean of Graduate Affairs in the Whiting School of Engineering – christinekavanagh@jhu.edu.

Prof. Mittal will first try to help you resolve your concern. If he is unable to resolve it, Mr. Bernard will assist, as will Assistant Dean Kavanagh if we cannot resolve your concern within the department.

3. The M.S.E. Degree Program

The Master of Science in Engineering (M.S.E.) degree requirements, along with general information, will be described here.

3.1. University and Whiting School Degree Requirements

Visit <http://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/> for information on school-wide requirements, such as:

- Two semesters of full-time course registration, also called “residency.”
- Course registration every semester.
- Completion of academic ethics and (if conducting research) responsible conduct of research courses.
- MSE essay submission.

See Section 3.5 for information on minimum credit enrollment maintain full-time “residency” status.

3.2. M.S.E. Mechanical Engineering - Degree Requirements

The M.S.E. degree may be a final degree or it may be earned *en route* to a Ph.D. degree. 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 are described in Sections “A” and “B,” where both sections must be met:

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

- At least four courses must be at the graduate level** (xxx.600 or higher, up to two Engineering for Professionals xx5.4xx or higher).
- No more than four courses may be at the advanced undergraduate level** (full-time programs xxx.400 – xxx.499, Engineering for Professionals xx5.3xx).
- 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.
- Ineligible Courses:** EN.530.800 Independent Study, EN.530.600 or EN.530.820 (Fall 2020 and later) MSE All-Course Graduate Research, EN.530.602 or EN.530.821 (Fall 2020 and later) Master’s Essay - Research and Writing, EN.530.609 or EN.530.822

(Fall 2020 and later) Master's Essay - Co-Op, EN.530.801 PhD Graduate Research, and other departments' Graduate Research, Independent Study, and Special Studies are not eligible courses to complete Section A's requirement.

- e) At least 4 of 10 courses, or at least 3 of 8 courses if writing an essay - must be **Mechanical Engineering or related courses**:
- o EN.530.xxx Mechanical Engineering
 - o Any of these courses:
 - EN.580.451/452 (Fall/Spring) - Cell and Tissue Engineering
 - Intro to Linear Systems - any one of EN.530.616, EN.520.601, or EN.580.616.
 - EN.560.772 Nonlinear Finite Element Methods
 - EN.560.773 Finite Element Methods
 - EN.520.773 Advanced Topics in Fabrication and Microengineering
 - o EN.535.xxx - courses from the [Engineering for Professionals \(EP\) program](#). **New in Fall 2020**:
 - For all current and incoming students enrolled in the Fall 2020 semester - no more than three "EP" courses can count. This is to accommodate those impacted by the COVID-19 pandemic.
 - For students matriculating in Spring 2021 and later - no more than two "EP" courses can count.

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

COURSE OPTION

- a) **Two additional one-semester graduate-level courses** (xx.xxx.6xx or higher, Engineering for Professionals EN.xx5.4xx or higher).
- b) **EN.530.600 or EN.530.820 (Fall 2020 and later) MSE All-Course - Graduate Research** - one of these two courses can be EN.530.600/820 - MSE All-Course - Graduate Research. Students must also have completed the appropriate Responsible Conduct of Research and Research Laboratory Safety courses.
- c) **Ineligible Courses:** EN.530.800 Independent Study, EN.530.602 or EN.530.821 (for those matriculating Fall 2020 and later) Master's Essay Research and Writing, EN.530.609 or EN.530.822 (for those matriculating Fall 2020 and later) Master's - Co-Op, EN.530.801/802 Ph.D. Graduate Research, and other departments' Graduate Research, Independent Study, and Special Studies are not eligible courses to complete Section B's requirement.

ESSAY OPTION

An M.S.E. essay (the official title of master's theses at Johns Hopkins) acceptable to your advisor and one other eligible reader.

There are two options to complete the essay:

- **Conduct Laboratory Research**

- Work with world-renowned engineering professors by conducting original research to produce an essay worthy of publication.
- [Learn more about the Research option here!](#)
- Students must register for the course EN.530.602 or EN.530.821 (for those matriculating Fall 2020 and later) Master’s Essay Research and Writing every semester that he or she works on master’s essay research and writing. This is separate from the Ph.D. dissertation.
- **Work in a Cooperative Educational Environment (Co-Op)**
 - To broaden the practical training for master’s students, the [Institute for Nanobiotechnology \(INBT\)](#) teams with companies to provide an immersive [master’s industry “co-op” experience](#) in a professional working environment. Goals and objectives are developed for the student in conjunction with faculty and INBT academic advisors, which will be used to complete the master’s essay.
 - [Learn more about the Co-Op program here!](#)
 - Course Registration
 - All students must register for the course EN.530.609 Master’s Essay – Co-Op every semester that he or she works in a co-op program to prepare to write a master’s essay. This is separate from the Ph.D. dissertation.
 - International students completing the degree with an Essay - Co-Op option must also enroll for EN.500.851 Engineering Research Practicum and apply for Curricular Practical Training (CPT). Visit these sites for information: [applying for CPT](#) and [extending the F-1 visa](#).

EN.530.602/EN.530.821 and EN.530.609/EN.530.822 are “Pass/Fail” courses that do not count as one of the eight courses required in addition to the essay. The courses are generally the equivalent of six credits and can be taken in one semester or split into three-credit courses over two semesters. If a student needs subsequent semesters to continue essay work, he or she can simply register for the same course each semester.

For the essay, the Responsible Conduct of Research and Research Laboratory Safety courses described elsewhere in this manual must be completed.

See Section 3.6.5 for information on the possibility of double-counting courses from a previous degree.

3.3. Master’s Degree Timeline

Students can generally expect to complete their degrees in these timeframes:

5th Year Masters (Hopkins MechE department alumni only)

- Junior/Senior Undergraduate Years
 - Double-count two .400-level academic courses from the Bachelor’s Degree.

- Take two courses that count for the master's degree but do not count for the Bachelor's Degree.
- Semester 1
 - Complete required introductory courses: Academic Ethics, Title IX & Harassment Prevention, and Opioid Epidemic Awareness
 - Take 3 academic courses
 - If taking or planning to take a research course or writing an essay, register for and complete:
 - ...required Lab Safety online modules and optional EN.500.601 Research Lab Safety course.
 - AS.360.624 online Responsible Conduct of Research course.
 - (Essay only) EN.530.602/EN.530.821 (for those matriculating Fall 2020 or later) Master's Essay - Research and Writing, or EN.530.609/EN.530.822 (for those matriculating Fall 2020 or later) Master's Essay - Co-Op - 3 credits
- Semester 2
 - All-Course: Take 3 academic courses and graduate.
 - Essay:
 - Take 1 academic course
 - Register for EN.530.602/EN.530.821 (for those matriculating Fall 2020 or later) Master's Essay - Research and Writing, or EN.530.609/EN.530.822 (for those matriculating Fall 2020 or later) Master's Essay - Co-Op - 3 credits
 - Continue essay research and begin writing the essay.
 - Complete the essay, have readers approve, submit essay to the library, and then graduate. Note that some students writing an essay may need a third semester to complete the program.

If students do not take two courses outside the bachelor's degree in their Undergraduate Years, they will likely have to return for a third semester. It is not recommended to take more than 3 courses in a semester. Please talk to your advisor first if you want to take more than 3 courses in one semester.

All-Course

- Semester 1
 - Complete required introductory courses: Academic Ethics, Title IX & Harassment Prevention, and Opioid Epidemic Awareness.
 - Take 3 academic courses
 - If taking or planning to take a research course, complete required Lab Safety and Responsible Conduct of Research courses
- Semester 2 - take 3 courses
- Semester 3 - take 3 courses
- Semester 4 - take 1 course and graduate.

It is not recommended to take more than 3 courses in a semester. Please talk to your advisor first if you want to take more than 3 courses in one semester.

Essay

- Semester 1
 - Complete required introductory courses: Academic Ethics, Title IX & Harassment Prevention, and Opioid Epidemic Awareness
 - Take 3 academic courses
- Semester 2
 - Take 3 academic courses
 - Complete required Lab Safety and Responsible Conduct of Research courses
 - Discuss essay topic with advisor and possibly begin research or arrange for co-op.
- Semester 3
 - Take 2 academic courses, begin or continue research, begin writing the essay.
 - Begin or continue research or co-op, begin writing the essay.
 - Register for EN.530.602 or EN.530.821 (for those matriculating Fall 2020 or later) MSE Essay Research and Writing (3 credits) or EN.503.609 or EN.530.822 (for those matriculating Fall 2020 or later) MSE Co-Op (3 credits).
- Semester 4
 - If needed, complete research or co-op.
 - Register for the appropriate course
 - If Part-Time: EN.530.602 or EN.530.821 (for those matriculating Fall 2020 or later) MSE Essay Research and Writing (3 credits) or EN.503.609 or EN.530.822 (for those matriculating Fall 2020 or later) MSE Co-Op (3 credits)
 - If Non-Resident: EN.910.600 Non-Resident Status (3 credits)
 - Complete the essay, have readers approve, submit essay to the library, then graduate.

Individual experiences may vary.

3.4. Course Levels

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 xx5.6xx and higher (e.g. EN.535.612).

Undergraduate

- Full-time program courses numbered xxx.400-xxx.499

3.5. Course Selection

The courses taken to complete the M.S.E. degree requirements should be selected based on each individual student's interests and strengths. Students should meet with their advisors early to plan their courses for the entire program, as many courses require prerequisites.

The following courses are suggested for M.S.E. students with particular interests. Students should discuss these and possibly other courses not listed with their advisors when making their selections.

3.5.1. EN.530.600 / 820 Master's Graduate Research - for "all-course" master's only

The EN.530.600 or EN.530.820 (for those matriculating Fall 2020 and later) Master's All-Course - Graduate Research course is intended to give a research experience to those pursuing an "all-course" master's degree.

- This course will count as one of the ten courses needed for the "all-course" master's degree requirements.
- While this course can be taken by those pursuing an "essay" master's degree, it will not count toward the "essay" master's degree requirements.
- This is an excellent course to gauge one's interest in research. It could result in a student's desire to pursue more research by switching from an "all-course" to an "essay" master's program or even to a Ph.D. program.

The course is generally the equivalent of three credits and lasts one semester. The research must be conducted at the level of at least a master's degree, as determined by a student's research supervisor, which may be one's academic advisor or another professor.

Approval of proposed research must be obtained from one's research supervisor and academic advisor before registering for the course. When registering for the course, the research supervisor's "section" should be selected to allow him or her to grade the course when complete. The course is subject to the usual academic performance requirements to count toward the degree.

3.5.2. Courses Required Master's Essay

These courses are intended to recognize the research and writing work to those pursuing an "essay" master's degree. They cannot be taken by those pursuing an "all-course" master's degree.

- EN.530.602 or EN.530.821 (for those matriculating Fall 2020 or later) Master's Essay - Research and Writing
- EN.530.609 or EN.530.822 (for those matriculating Fall 2020 or later) Master's Essay - Co-Op

Students must enroll in the appropriate “Pass/Fail” course when doing essay research or co-op for each semester where such work is done, typically in the last one or two semesters. While the courses can grant 3-10 credits per semester, most students will register for either 3 or 6 credits. Students must check with their faculty advisors to confirm when to register for the appropriate course.

These “Pass/Fail” courses do 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 essay work, he or she can simply register for the same course each semester.

According to the Graduate Board’s Procedures for Administration of Approved Policies for the Award of Advanced Degrees, “Thesis [essay] readers are selected and appointed by the chair or appropriate faculty of the sponsoring department or committee. Any duly appointed member of a department or committee holding the rank of assistant professor or higher (excluding lecturers) is eligible for selection as a referee without prior approval. The Graduate Board Office must approve readers from outside the University, or from any non-Ph.D. sponsoring department, laboratory or institute within the University.”

3.5.3. Aerospace – Suggested Courses

Upper-level Undergraduate Courses

- EN.530.418 Aerospace Structures and Materials
- EN.530.425 Mechanics of Flight
- EN.530.427 Intermediate Fluid Mechanics
- EN.530.432 Jet and Rocket Propulsion
- EN.530.435 Guidance and Control of Flight Vehicles
- EN.530.470 Space Vehicle Dynamics and Control

Graduate Courses

- EN.530.621 Fluid Dynamics I
- EN.530.622 Fluid Dynamics II
- EN.530.624 Dynamics of Robots and Spacecraft
- EN.530.625 Turbulence
- EN.530.627 Intermediate Fluid Mechanics (graduate)
- EN.530.726 Hydrodynamic Stability
- EN.530.767 Computational Fluid Dynamics

3.5.4. Bio-Mechanical Engineering - Suggested Courses

Upper-level Undergraduate Courses

- EN.530.410 Biomechanics of the Cell
- EN.530.426 Biofluid Mechanics
- EN.530.439 Comparative Biomechanics

- EN.530.441 Introduction to Biophotonics
- EN.530.445 Introduction to Biomechanics
- EN.530.446 Experimental Methods in Biomechanics
- EN.530.448 Biosolid Mechanics
- EN.530.473 Molecular Spectroscopy and Imaging
- EN.530.475 Locomotion I: Mechanics
- EN.530.485 Physics and Feedback in Living Systems
- EN.530.495 Microfabrication Lab

Graduate Courses

- EN.530.610 Statistical Mechanics in Biological Systems
- EN.530.633 Mechanics of the Biological Systems and Biophysical Methodologies
- EN.530.639 Comparative Biomechanics (graduate)
- EN.530.672 Biosensing and BioMEMS
- EN.530.675 Locomotion I: Mechanics
- EN.530.676 Locomotion II: Dynamics

Courses Outside Mechanical Engineering

- EN.510.606 Chemical and Biological Properties of Materials
- EN.510.607 Biomaterials II
- EN.540.626 Biomacromolecules at the Nanoscale
- EN.580.451 Cell and Tissue Engineering Laboratory 1
- EN.580.452 Cell and Tissue Engineering Laboratory 2
- EN.580.641 Cellular Engineering
- EN.580.642 Tissue Engineering

3.5.5. Energy - Suggested Courses

Upper-level Undergraduate Courses

- EN.530.427 Intermediate Fluid Mechanics
- EN.530.464 Energy Systems Analysis

Graduate Courses

- EN.530.627 Intermediate Fluid Mechanics (graduate)
- EN.530.629 Simulation and Analysis of Ocean Wave Energy Systems
- EN.530.632 Convection
- EN.530.664 Energy Systems Analysis (graduate)

Courses Outside Mechanical Engineering

- EN.510.405 Materials Science of Energy Technologies
- EN.520.627 Photovoltaics and Energy Devices
- EN.540.619 Project in Design: Alternative Energy
- EN.570.607 Energy Policies and Plan Models
- EN.570.612 Infrastructure Modeling, Simulation, and Analysis

3.5.6. Fluid Mechanics - Suggested Courses

Upper-level Undergraduate Courses

- EN.530.427 Intermediate Fluid Mechanics
- EN.530.426 Biofluid Mechanics
- EN.530.432 Jet and Rocket Propulsion
- EN.530.443 Fundamentals, Principles, and Application of Microfluidic Systems

Graduate Courses

- EN.530.621 Fluid Dynamics I
- EN.530.622 Fluid Dynamics II
- EN.530.625 Turbulence
- EN.530.627 Intermediate Fluid Mechanics (graduate)
- EN.530.629 Simulation and Analysis of Ocean Wave Energy Systems
- EN.530.632 Convection
- EN.530.643 Fundamentals, Principles, and Application of Microfluidic Systems (graduate)
- EN.530.726 Hydrodynamic Stability
- EN.530.767 Computational Fluid Dynamics

Courses Outside Mechanical Engineering

- AS.270.425 Earth and Planetary Fluids
- AS.270.661 Planetary Fluid Dynamics
- EN.540.652 Advanced Transport Phenomena
- EN.560.682 Introduction to Water Wave Mechanics

3.5.7. Mechanical Design - Suggested Courses

Upper-level Undergraduate Courses

- EN.530.403 Engineering Senior Design Project I
- EN.530.404 Engineering Senior Design Project II
- EN.530.414 Computer Aided Design
- EN.530.417 Fabricatology – Advanced Materials Processing
- EN.530.418 Aerospace Structures and Materials
- EN.530.420 Robot Sensors and Actuators
- EN.530.421 Mechatronics
- EN.530.430 Applied Finite Element Analysis
- EN.530.455 Additive Manufacturing
- EN.530.474 Effective and Economic Design for Biomedical Instrumentation

Graduate Courses

- EN.530.613 Master's Design Project I
- EN.530.614 Master's Design Project II
- EN.530.618 Fabricatology – Advanced Materials Processing

- EN.530.619 Aerospace Structures and Materials
- EN.530.655 Additive Manufacturing
- EN.530.674 Effective and Economic Design for Biomedical Instrumentation
- EN.530.683 Applied Computational Modeling in Aerodynamics and Heat Transfer
- EN.530.691 Haptic Interface Design for Human-Robot Interaction

Courses Outside Mechanical Engineering

- EN.601.456 Computer Integrated Surgery II

3.5.8. Mechanics and Materials - Suggested Courses

Upper-level Undergraduate Courses

- EN.530.405 Mechanics of Advanced Engineering Structures
- EN.530.418 Aerospace Structures and Materials
- EN.530.430 Applied Finite Element Analysis
- EN.530.448 Biosolid Mechanics

Graduate Courses

- EN.530.605 Mechanics of Solids and Materials
- EN.530.606 Mechanics of Solids and Materials II
- EN.530.642 Plasticity
- EN.530.656 Deformation Mechanisms
- EN.530.730 Finite Element Methods
- EN.530.748 Stress Waves, Impacts and Shockwaves

Courses Outside Mechanical Engineering

- EN.540.640 Micro/Nanotechnology: Science / Engineering of Small Structures
- EN.510.601 Structure of Materials
- EN.510.604 Mechanical Props of Materials
- EN.560.604 Solid Mechanics for Structures

3.5.9. Robotics and Systems, Modeling, and Controls - Suggested Courses

Upper-level Undergraduate Courses

- 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

- EN.530.603 Applied Optimal Control
- EN.530.624 Dynamics of Robots and Spacecraft
- EN.530.646 Robot Devices, Kinematics, Dynamics, and Control
- EN.530.649 Adaptive Systems and System Identification

- EN.530.653 Advanced Systems Modeling
- EN.530.675 Locomotion I: Mechanics
- EN.530.676 Locomotion II: Dynamics
- EN.530.678 Nonlinear Control and Planning in Robotics
- EN.530.686 Mechanics of Locomotion
- EN.530.691 Haptic Interface Design for Human-Robot Interaction

Courses Outside Mechanical Engineering

- EN.580.616 Introduction to Linear Dynamical Systems
- EN.520.601 Introduction to Linear Systems Theory
- EN.601.463 Algorithms for Sensor-Based Robotics (undergrad)
- EN.601.663 Algorithms for Sensor-Based Robotics (grad)

3.5.10. Applied Mathematics, Numerical Analysis, and Computational Methods - Suggested Courses

The master's degree requirements state that at least two courses should be in applied mathematics, numerical analysis, or computational methods. With advisor approval, any of these courses can be applied to that requirement, though this is not an exhaustive list.

Upper-level Undergraduate Courses

- EN.530.430 Applied Finite Element Methods

Graduate Courses

- EN.530.641 Statistical Learning for Engineers
- EN.530.653 Advanced Systems Modeling I
- EN.530.654 Advanced Systems Modeling II
- EN.530.761 Math Methods for Engineers
- EN.530.766 Numerical Methods
- EN.530.767 Computational Fluid Dynamics

Courses Outside Mechanical Engineering

- Most upper-undergraduate or graduate level courses offered by the Applied Mathematics department (EN.553.4xx or higher)
- EN.520.601 Introduction to Linear Systems Theory
- EN.520.621 Introduction to Nonlinear Systems
- EN.535.641 Mathematical Methods for Engineers (Engineering for Professionals)
- EN.560.601 Applied Math for Engineers
- EN.560.730 Finite Element Methods
- EN.601.464 Artificial Intelligence (undergraduate)
- EN.601.664 Artificial Intelligence (graduate)
- EN.601.475 or EN.601.476 Machine Learning (undergraduate)
- EN.601.675 or EN.601.676 Machine Learning (graduate)
- EN.615.441 Mathematical Methods for Physics and Engineering (Engineering for Professionals)

- Some upper-undergraduate or graduate level courses offered by the Computer Science department (EN.601.4xx or higher)

Note: EN.530.414 Computer Aided Design does not count for this requirement.

3.5.11. Frequency of Course Offerings

Graduate courses are offered in specific semesters, and sometimes in alternating years. These offerings are subject to change due to instructor sabbaticals or unusual situations. Please confirm these offerings when planning your course schedule.

(See the next page...)

MECHANICAL ENGINEERING – COURSES – ANTICIPATED OFFERINGS

Semester	Math/ Computational /Design	Robotics, Systems and Controls	Fluid Mechanics / Energy	Mechanics and Materials	Bio-Mechanical Engineering
Fall 2020 (confirmed)	<ul style="list-style-type: none"> - EN.530.414 Computer Aided Design - EN.530.430 Applied Finite Element Analysis - EN.530.613 Master's Design Project I - EN.530.761 Math Methods for Engineers - EN.530.766 Numerical Methods 	<ul style="list-style-type: none"> - EN.530.420 Robot Sensors and Actuators - EN.530.424 / 624 Dynamics of Robots and Spacecraft - EN.530.468 / 668 Locomotion Mechanics: Fundamentals - EN.530.603 Applied Optimal Control - EN.530.616 Intro to Linear Systems Theory - EN.530.641 Statistical Learning for Engineers - EN.530.646 Robot Devices, Kinematics, Dynamics, and Control - 530.691 Haptic Interface Design for Human-Robot Interaction 	<ul style="list-style-type: none"> - EN.530.443 / 643 Fundamentals, Design Principles, and Applications of Microfluidic Systems - 530.483 / 683 Applied Computational Modeling in Aerodynamics and Heat Transfer - EN.530.621 Fluid Dynamics I - EN.530.629 Simulation and Analysis of Ocean Wave Energy Systems - EN.530.726 Hydrodynamic Stability - EN.530.766 Numerical Methods - 530.777 Multiphase Flow 	<ul style="list-style-type: none"> - EN.530.483/683 Computational Modeling in Aerodynamics and Heat Transfer - EN.530.605 Mechanics of Solids and Materials I - EN.530.642 Plasticity - EN.530.738 Micromechanics of Heterogeneous and Granular Materials 	<ul style="list-style-type: none"> - EN.530.443 / 643 Bioinspired Science and Technology - EN.530.446 Experimental Biomechanics - EN.530.473 Molecular Spectroscopy and Imaging - EN.530.474/674 Effective and Economic Design for Biomedical Instrumentation - EN.530.495 Microfabrication Laboratory - EN.530.610 Statistical Mechanics in Biological Systems
Spring 2021 (anticipated)	<ul style="list-style-type: none"> - EN.530.480 Image Processing and Data Visualization - EN.530.614 Master's Design Project II 	<ul style="list-style-type: none"> - EN.530.421 Mechatronics - EN.530.470 Space Vehicle Dynamics and Control - EN.530.475 /675 Locomotion I: Mechanics - EN.530.616 Intro to Linear Systems Theory - EN.530.645 Kinematics - EN.530.646 Robot Devices, Kinematics, Dynamics and Control - EN.530.663 Robot Motion Planning - EN.530.675 Locomotion I: Mechanics - EN.530.678 Nonlinear Control and Planning in Robotics - EN.530.707 Robot Systems Programming 	<ul style="list-style-type: none"> - EN.530.427/627 Intermediate Fluid Mechanics - 530.608 Experimental Fluid Dynamics - EN.530.622 Fluid Dynamics II - EN.530.632 Convection - EN.530.726 Hydrodynamic Stability - EN.530.767 Computational Fluid Dynamics 	<ul style="list-style-type: none"> - EN.530.606 Mechanics of Solids and Materials II - EN.530.618 Fabricatology - EN.530.642 Plasticity - EN.530.655 Additive Manufacturing - EN.530.732 Fracture Mechanics 	<ul style="list-style-type: none"> - EN.530.441 Intro to Biophotonics - EN.530.475 / 675 Locomotion I: Mechanics - EN.530.480 Image Processing and Data Visualization

MECHANICAL ENGINEERING – COURSES – ANTICIPATED OFFERINGS					
Semester	Math/ Computational	Robotics, Systems and Controls	Fluid Mechanics / Energy	Mechanics and Materials	Bio-Mechanical Engineering
Fall 2021 (anticipated)	- EN.530.414 Computer Aided Design - EN.530.430 Applied Finite Element Analysis - EN.530.613 Master's Design Project I - EN.530.641 Statistical Learning for Engineers - 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.530.475 /675 Locomotion I: Mechanics - EN.530.603 Applied Optimal Control - EN.530.646 Robot Devices, Kinematics, Dynamics, and Control - EN.530.691 Haptic Interface Design for Human-Robot Interaction	- EN.530.418 / 619 Aerospace Structures and Materials - EN.530.425 Mechanics of Flight - EN.530.443 / 643 Fundamentals, Design Principles, and Applications of Microfluidic Systems - EN.530.621 Fluid Dynamics I - EN.530.625 Turbulence - EN.530.629 Simulation and Analysis of Ocean Wave Energy Systems - EN.530.710 Optical Measurement Techniques	- EN.530.418 / 619 Aerospace Structures and Materials - EN.530.455/655 Additive Manufacturing - EN.530.605 Mechanics of Solids and Materials I	- EN.530.436/636 Bioinspired Science and Technology - EN.530.439 / 639 Comparative Biomechanics - EN.530.445 Introduction to Biomechanics - EN.530.448 Biosolid Mechanics - EN.530.473 Molecular Spectroscopy and Imaging - EN.530.474 / 674 Effective Design for Biomedical Instrumentation - EN.530.475/675 Locomotion I: Mechanics - 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 2022 (anticipated)	- EN.530.480 Image Processing and Data Visualization - EN.530.614 Master's Design Project II	- EN.530.421 Mechatronics - En.530.646 Robot Devices, Kinematics, Dynamics, and Control - EN.530.647 Adaptive Systems and Control - EN.530.663 Robot Motion Planning - EN.530.676 Locomotion Dynamics and Control - EN.530.678 Nonlinear Control and Planning in Robotics - EN.530.707 Robot System Programming	- EN.530.426 Biofluid Mechanics - EN.530.432 Jet and Rocket Propulsion - EN.530.464/664 Energy Systems Analysis - EN.530.622 Fluid Dynamics II - EN.530.632 Convection - EN.530.767 Computational Fluid Dynamics	- EN.530.417/618 Fabricatology - EN.530.606 Mechanics of Solids and Materials II - EN.530.612 Computational Solid Dynamics - EN.530.748 Stress Waves, Impacts, and Shockwaves	- EN.530.410 Biomechanics of the Cell - EN.530.426 Biofluid Mechanics - EN.530.441 Intro to Biophotonics - EN.530.480 Image Processing and Data Visualization - EN.530.672 Biosensing and BioMEMS

Table 1 – Anticipated Course Frequencies

3.6. Course Registration and Credits

3.6.1. Credits

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 (.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**. This is also known as full-time “residency.”
- Students can achieve full-time status by registering for any combination of courses and seminars, as approved by one’s advisor. SIS is set to select appropriate credits:
 - Seminars – 1 credit
 - WSE courses, both undergraduate and graduate – 3 or 4 credits
 - EN.530.600 / or EN.530.820 (Fall 2020 and later) Master’s Graduate Research – 3-10 credits
 - EN.530.602 /EN.530.821 (for those matriculating Fall 2020 or later) Master’s Essay - Research and Writing – 3-10 credits – enroll for this “Pass/Fail” course when doing essay research and writing
 - EN.530.609 /EN.530.822 (for those matriculating Fall 2020 or later) Master’s Essay – Co-Op – 3-10 credits – enroll for this “Pass/Fail” course when doing essay research and writing
 - 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.
- Students enrolled in fewer than 9 credits per semester are part-time, which may affect residency requirements for all and visa concerns for international students. Please ask your faculty advisor or Academic Program Manager Mike Bernard your questions before registering or changing a course from “letter grade” to “audit.”
- Visit the Whiting School’s Frequently Asked Questions page at <http://homewoodgrad.jhu.edu/academics/wse-graduate-credit-hours/> for more information.

3.6.2. 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.

3.7. Course Information and Policies

3.7.1. Engineering for Professionals Courses

The Whiting School of Engineering’s “Engineering for Professionals” (EP) program offers a variety of classroom and online courses. EP courses at .400-level or above are considered graduate level courses. EP courses at the .300-level are counted as intermediate/advanced undergraduate courses. Visit <http://ep.jhu.edu/> for information.

3.7.2. Required Mechanical Engineering Courses

There are a minimum required number of courses that must be taken for the M.S.E. degree (not including those listed in Section 2.3), including at least two .600- or .700-level courses, that must be offered by the Mechanical Engineering department (numbered EN.530.xxx) or the Engineering for Professionals’ Mechanical Engineering program (number EN.535.xxx):

- Four of 10 courses for the “all-course” option
- Three of 8 courses for the “essay/thesis” option

3.7.3. Only One C-type Grade Can Count Toward the M.S.E.

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

3.7.4. “Pass” Grade Not Accepted

Pass grades are not accepted for courses counting toward the Master’s degree.

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.

3.7.5. Double-Counting Courses

There may be opportunities to double-count up to two courses taken for previous degrees, but only with the permission of the master’s faculty advisor.

The Mechanical Engineering department follows the Whiting School of Engineering policy on double-counting courses at <https://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/>.

3.8. MSE Essay

3.8.1. 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 a 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.

3.8.2. Avoid Tuition Payments in Grace Period

You may avoid paying tuition in your last semester if you complete and submit your essay in the Grace Period:

- Fall - within the first eight weeks of the semester
- Spring - within the first four weeks of the semester

If you plan to submit your essay during the tuition Grace Period, instead of paying tuition, you can submit a Tuition Deferral Form, available at

<https://studentaffairs.jhu.edu/student-accounts/>. A department representative must sign the form before submitting it to the Student Accounts office.

3.8.3. Submission and Printing of Essays

Masters essays will be submitted only by electronic media. For information, contact the Library ETC office 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.

3.9. Academic Performance Requirements

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.

Unsatisfactory academic performance is noted when a student earns...

- one grade of D or F; or
- two C+, C, or C- grades; or
- a combination of one C+, C, or C- grade and one D or F grade

The student will receive notification, with a copy to his or her advisor, of academic performance concerns. The notification will explain that a second D or F grade or a third C+, C, or C- or lower grade for a master's student will result in termination from the program.

3.10. Degree Completion

3.10.1. Degree Completion Deadlines

The master's degree completion schedule and 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.

3.10.2. Degree Completion Time Limit

The Whiting School of Engineering states that students must earn the master's degree within five consecutive academic years (10 semesters). Only semesters during which a student has a university-approved leave of absence are exempt from the ten semester limit; otherwise, all semesters from the beginning of the student's graduate studies – whether the student is a resident or not – count toward the ten semester limit.

3.10.3. 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" page at <https://me.jhu.edu/graduate-studies/academic-advising-graduate/preparing-for-graduation/> for more information.

3.10.4. Exit Survey and Interview

Graduating students will complete a required exit survey and are invited to have an optional interview with the Director of Graduate Studies or designated interviewer. Students will be invited to complete the survey during the last few weeks of the semester in which they expect to graduate and an interview will be arranged after the survey is completed.

3.11. Switching from an M.S.E. to Ph.D. Degree

Masters students may be given an opportunity to switch to the Ph.D. program. Students with sufficient interest who demonstrate exemplary academic performance may request to switch their degree program after at least one semester. Most students who switch do so usually by the end of their third semester, in time to take the Departmental Qualifier Examination (see the JHU Mechanical Engineering Ph.D. Student Advising Manual).

The process to switch programs is as follows:

- The student seeks a Mechanical Engineering professor willing to advise a Ph.D. student.
- The student writes an updated Statement of Purpose that expresses his or her goals for academic knowledge and research at the Ph.D. level.
- The professor writes a recommendation letter stating his or her willingness to advise the student, as well as any financial aid being offered.
- The student will enter an online “Internal Transfer” application to the University graduate application system. Visit the [Internal Graduate Applicant](#) page of the Graduate Admissions page for instructions to submit an application.
- The student will receive and accept admission to the Ph.D. program.
- The Graduate Admissions office, Registrar, and the Office of International Services (for international students) will be notified of the change in degree.
- The Academic Program staff will arrange financial aid, as offered.
- The student will begin studies and research in the Ph.D. program to which he or she is admitted.

3.12. Dual MSE for Current Hopkins Students in other Departments

Current Hopkins PhD students in other departments may be eligible to earn a MSE Mechanical Engineering. “Dual” status means that a PhD student earns a master’s degree outside his or her primary department’s PhD program simultaneously with his or her PhD work.

To apply for the “dual” MSE in Mechanical Engineering, take these steps:

- Visit the “[Internal Graduate Applicant](#)” page of the Graduate Admissions page for instructions to submit an application. Notify [Academic Program Manager Mike Bernard](#) that you plan to submit the application.
- Provide Mike a letter from the chairman of the PhD department that you are allowed to earn the MSE in Mechanical Engineering.

- Provide Mike the following items:
 - A new statement of purpose.
 - At least one letter of recommendation.
 - International students must provide a [Graduate International Student Notification Form](#).
- Provide Mike with the name of the Mechanical Engineering faculty member who will serve as the academic advisor to confirm your degree completion. The advisor can either be a [full-time faculty member](#) or a [secondary or joint faculty appointee](#).

Your application will be considered for admission to the MSE program and you will be notified upon admission what steps will be needed to confirm eligibility to earn the degree.

4. Full-Time, Part-Time, Non-Resident, Leave of Absence

4.1. Part-Time Status and Tuition

Master's students of the Department of Mechanical Engineering may become eligible for part-time status.

"ALL-COURSE" MASTER'S STUDENTS

Master's students must register full-time most or all semesters for a minimum of nine credits. If in a student's final semester, less than nine credits are needed to complete the degree requirements, students can switch to part-time status.

"ESSAY" MASTER'S STUDENTS

After meeting the minimum two-semester residency requirement - where a student pays full-time tuition for a minimum of two semesters - Whiting School master's students who have not yet completed research to where the final and sole activity is essay writing must maintain "residency" status, but can register "part-time" by registering for eight credits or less per semester.

For each semester where essay research and writing occurs, students must register for three credits of EN.530.602 / EN.530.821 (for those matriculating Fall 2020 or later) Master's Essay - Research and Writing or EN.530.609 / EN.530.822 Master's Essay - Co-Op - 3-10 credits - enroll for the appropriate "Pass/Fail" course when doing an essay.

PART-TIME TUITION

Students are charged tuition per-credit, which in the 2019-20 academic year is \$1,845 per-credit.

COURSE REGISTRATION

The Mechanical Engineering department requires enrollment in courses:

- Any remaining courses for the degree - 3-4 credits each
- EN.530.602 / EN.530.821 (for those matriculating Fall 2020 or later) Master's Essay - Research and Writing or EN.530.609 / EN.530.822 Master's Essay - Co-Op - 3-10 credits - for essay/thesis master's students only.

PART-TIME RESTRICTIONS

- Part-time American students are ineligible to work as a student worker, including as a Teaching Assistant, and will not be eligible for graduate student salary.
 - EXCEPTION: International students in their final semester who are part-time are eligible to work as a student worker. (International students are full-time students every semester except for the last semester if they need less than a full-time course load to complete the degree. They can then become part-time.)
- Part-time students enrolled in the University health insurance must pay the full premium, which in 2019-20 is \$1,103 per semester.

HOW TO OBTAIN PART-TIME STATUS

- Contact Academic Program Manager Mike Bernard to confirm eligibility to switch.
- International students must first obtain approval from the International Office by completing a [Reduced Course Load E-form](#).

RESOURCES

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

4.2. Non-Residency Status and Tuition

“ALL-COURSE” MASTER’S STUDENTS

Students taking the “all-course” master’s degree are not eligible for non-residency status.

“ESSAY” MASTER’S STUDENTS

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

Whiting School graduate students are typically granted only one semester of non-residency with the expectation that the essay will be written, read, and approved in that semester. 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.

4.3. Leave of Absence

Occasionally, extenuating circumstances may require graduate students to take a leave of absence from their studies.

Graduate students may apply for up to four semesters of leave of absence when medical conditions, compulsory military service, or personal or family hardship prevents them from continuing their graduate studies.

Visit the [Homewood Graduate and Postdoctoral Affairs page for Enrollment Change forms](#). Select the appropriate form to either request, extend, or return from a Leave of Absence.

The forms will explain that student privileges, degree progress, and access to health insurance may be affected. Contact the Registrar's health insurance staff at ASENInsurance@jhu.edu to discuss your situation and determine what options exist.

Please complete the form, obtain the appropriate signatures, and obtain the required documentation as noted on the form, and send or deliver the completed form and supporting documentation to Academic Program Manager Mike Bernard in Latrobe 230 or at me-academic@jhu.edu.

RESOURCES

- Homewood Graduate and Postdoctoral Affairs page for Enrollment Change forms: <https://homewoodgrad.jhu.edu/academics/graduate-board/enrollment-status-change-forms/>
- 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)

5. Miscellaneous Academic Information

5.1. General Policy Information

The Whiting School of Engineering and Johns Hopkins University set and administer a variety of policies that affect students. The following websites provide information on these policies; but are not all-inclusive. Your academic staff can help with policy questions and interpretations.

- Graduate and Postdoctoral Affairs at Homewood - <https://homewoodgrad.jhu.edu/>
- Graduate and Postdoctoral Affairs at Homewood – Graduate Residency and Registration - <http://homewoodgrad.jhu.edu/academics/graduate-board/new-grad-board-residency-page/>
- Whiting School of Engineering’s Graduate Academic Policies - <https://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/>
- Johns Hopkins University E-Catalog section for Graduate Students - <http://e-catalog.jhu.edu/grad-students/>

5.2. 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 essay 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 Spring, 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 next year. The student and advisor will both sign the evaluation, after which it will be delivered to the Academic Administrative staff by April 30.

5.3. Departmental Seminars

Part of the Johns Hopkins graduate experience is to be informed about and learn to evaluate the research done by others, both at Johns Hopkins and at leading institutions. The Mechanical Engineering Department hosts weekly seminars every Thursday during the Fall and Spring semesters. The Fluids and Mechanics and Materials groups also hold weekly student seminars on Fridays.

There are also a number of special seminars in the department and regular seminars in other departments, such as Materials Science and Engineering, Earth and Planetary Sciences, and Biomedical Engineering; and Centers, such as CEA FM, CAMCS, HEMI, and CISST.

M.S.E. students are encouraged, although not required, to attend at least some of these seminars.

5.4. Teaching Assistant Positions

To assist in the teaching functions of the Department, Teaching Assistant (TA) opportunities are provided to students to grade homework and 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 the academic year.

Position openings are announced at the beginning of each semester. Any student interested in being a Teaching Assistant for a particular course or instructor is advised to contact that instructor well before the start of the semester.

5.5. 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.

6. Administration

6.1. Department Offices

The Mechanical Engineering 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.

6.2. 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 copier and scanner 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. In unusual circumstances, the copier may be used on a limited basis for personal needs.

FAX MACHINE - The number for the fax machine in Latrobe 217 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, 443, or 667:
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, 443, and 667), 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 - Graduate students may opt to have a mailbox on the 3rd floor of Latrobe Hall. 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 Latrobe 217.**

KITCHEN, including COFFEE and TEA SERVICE - A refrigerator and microwave oven are available on the 3rd floor of Latrobe Hall to store and heat your meals. Please help keep the kitchen area clean.

6.3. Additional Services and Resources

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

- **Registrar** - <https://studentaffairs.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 - <https://studentaffairs.jhu.edu/campus-ministries>
- **Counseling Center** - whenever we need a little extra help from our friends - <https://studentaffairs.jhu.edu/counselingcenter>
- **The Hub** - the University's official news publication - <http://hub.jhu.edu>
- **Johns Hopkins Magazine** - <http://hub.jhu.edu/magazine>

7. Safety and Security

7.1. 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.

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 concerning its operation and all safety aspects. The PI's for each lab are listed on the entrance door to each lab.

7.1.1. Research Laboratory Safety – Training

The University offers research laboratory safety training, which is now a requirement for all Mechanical Engineering graduate students. The training is offered in the following modes:

A series of eight online learning modules

- Introduction in ethics, hazards, and risk evaluation
- Physical hazards
- Chemical hazards
- Biological
- Radiation
- Hazard analysis
- Design for safety
- Writing protocols and procedures

EN.500.601 Research Laboratory Safety – a six-week lecture course. Completion of the online learning modules is a prerequisite.

ONLINE LEARNING MODULES REQUIRED FOR ALL GRADUATE STUDENTS

All new Mechanical Engineering graduate students should complete the online learning modules within the first two weeks of their first enrolled semester.

The online modules are currently available at [My.JHU.edu](https://my.jhu.edu) -> My Learning. Search for “Laboratory Safety Assessment Part 1...,” “Laboratory Safety Assessment Part 2...,” and so on. Once all eight courses are completed, an internal SIS “course” numbered EN.990.600 will be entered on students’ records, which will allow students to enroll in EN.500.601 (but EN.990.600 will not appear on a student's transcript nor on a student's course registration in SIS).

LECTURE ENCOURAGED OR REQUIRED FOR SOME GRADUATE STUDENTS

Advisors may encourage or require Mechanical Engineering graduate students to take EN.500.601 Research Laboratory Safety.

- The course is offered in the last six weeks of a semester
- Students must complete the online modules before registering for the course.

7.1.2. Safety Resources

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.

7.2. 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 do not 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, do not 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.

8. Facilities

8.1. 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.

8.2. 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 <https://wsemanufacturing.jhu.edu/>.

8.3. 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.

8.3.1. 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.

8.3.2. WSE Information Technology

WSE IT is tasked with supporting the IT needs of the Whiting School of Engineering 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.

8.3.3. Software Downloads

The university owns licenses of 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.

9. 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 <https://studentaffairs.jhu.edu/disabilities/>, contact them at 410-516-4720 or studentdisabilityservices@jhu.edu, or visit their office in 385 Garland Hall.

10. Groups and Activities

10.1. 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, visit <https://me.jhu.edu/mega/>.

10.2. 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.

10.3. American Society of Mechanical Engineers (ASME)

Visit the ASME faculty advisor, Dr. Steven Marra (marra@jhu.edu) in Latrobe 123 for information and application materials. Information about ASME can be found at <http://www.asme.org/>.

10.4. Extracurricular Activities

As a department, Mechanical Engineering participates in University intramural athletics. Mechanical Engineering fields 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 invited to 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 and assist with arrangements.

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

10.4.1. Johns Hopkins University

- **Campus Life** - <https://www.jhu.edu/life/>
- **Arts and Culture** - <https://www.jhu.edu/life/arts-culture/>
- **Recreation Center** – grad students have free membership - <https://studentaffairs.jhu.edu/recreation/>.
- **Hopkins Athletics** - <http://www.hopkinssports.com/>

10.4.2. 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/>

11. 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.

12. 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 Degree Completion				
Master of Science in Engineering - Department of Mechanical Engineering				
	Name			
	Hopkins ID#			
	Faculty Advisor			
	I am a...	<input type="checkbox"/> Master's student	<input type="checkbox"/> PhD student earning an MSE	
	Semester of Graduation			
	Last Semester Registered			
	Required Intro Courses	EN.500.603 Academic Ethics	Title IX	Opioid Epidemic Awareness
	Semester Completed			

SECTION A: Eight one-semester courses approved by faculty advisor

Semester	Course Number	Course Name	Grade	Credits	Double Counted from JHU BS?	Is the Course Transferred from Another Institution?	Math Course?

- **At least four courses must be at the graduate level** (xxx.600 or higher, up to two Engineering for Professionals xx5.4xx or higher).
- **No more than four courses may be at the advanced undergraduate level** (full-time programs xxx.400 – xxx.499, Engineering for Professionals xx5.3xx). Note: for students matriculating in Spring 2018 and later, only advanced undergraduate courses (xxx.400-499, xx5.4xx) are accepted.
- **At least two courses should be in applied mathematics, numerical analysis, or computational methods (“Math Course?” above).** This requirement can be waived in writing by your advisor, if sufficient prior preparation in these areas can be demonstrated.
- **Ineligible Courses:** EN.530.800 Independent Study, EN.530.801/802 PhD Graduate Research, EN.530.600/820 MSE Graduate Research, EN.530.602/609 or EN.530.821/822 (for those matriculating Fall 2020 or later) MSE Essay and other departments’ Graduate Research, Independent Study, and Special Studies are not eligible courses to complete Section A’s requirement. See Section B regarding how EN.530.600/820 MSE All-Course - Graduate Research could possibly be counted.
- **At least half of all courses** counted toward the master’s degree – at least 5 of 10, or at least 4 of 8 if writing an essay - must be Mechanical Engineering: either - all EN.530.xxx Mechanical Engineering - or - up to two courses from EN.535.xxx Engineering for Professionals’ Mechanical Engineering and the rest EN.530.xxx Mechanical Engineering.
- **No more than two courses** may be chosen from the Engineering for Professionals program.
- **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 the degree. “Pass” or “P” grades are not accepted.

Please see the next page for SECTION B...

SECTION B: Complete either the “Course Option” or the “Essay Option” but not both.

Course Option

Two additional one-semester courses approved by the faculty advisor.

- **Two additional one-semester graduate-level courses** (xx.xxx.6xx or higher, Engineering for Professionals EN.xx5.4xx or higher).
- **EN.530.600/820 MSE All-Course Graduate Research***
 - **BS/MSE and MSE students only:** one of these two courses can be EN.530.600 / EN.530.820 MSE All-Course - Graduate Research. Students must also have completed the appropriate Responsible Conduct of Research and Research Laboratory Safety courses.
 - **PhD students** earning the MSE degree cannot count EN.530.600 / EN.530.820 MSE All-Course - Graduate Research.
- **Ineligible Courses:** EN.530.800 Independent Study, EN.530.602 / EN.530.821 Master’s Essay - Research and Writing, EN.530.609 / EN.530.822 and other departments’ Graduate Research, Independent Study, and Special Studies are not eligible courses to complete Section B’s requirement.

Semester	Course Number	Course Name	Grade	Credits	Double Counted from JHU BS?	Is the Course Transferred from Another Institution?	Math Course?

* If counting EN.530.600/820 MSE All-Course - Graduate Research, this section must be completed.

Requirement	Date or Semester Completed / Training Description
AS/EN.360.624 (online) or AS/EN.360.625 (in-person, for NIH funded) Responsible Conduct of Research	
Research Laboratory Safety – date completed and briefly describe training done.	

Essay Option

Write an essay acceptable to the faculty advisor and one other reader, plus the completion of these requirements.

Requirement	Date or Semester Completed / Training Description
AS/EN.360.624 (online) or AS/EN.360.625 (in-person, for NIH funded) Responsible Conduct of Research	
Research Laboratory Safety – date completed and briefly describe training done.	
EN.530.602 or EN.530.821 Master’s Essay - Research and Writing or EN.530.609 or EN.530.822 Master’s Essay - Co-Op Six credits (one 6-credit or two 3-credit courses). List semester(s) the course(s) were completed.	

Essay Title: _____

Was the Essay Submitted to the Library? No Yes Date Submitted, if “Yes:” _____

ADVISOR’S CERTIFICATION

After reviewing the degree requirements, I am satisfied that this student has completed all of the requirements for the Master of Science in Engineering Degree in the Department of Mechanical Engineering.

Advisor’s Signature

Date