MASTER IN SCIENCE IN
ENGINEERING IN ROBOTICS

GRADUATE STUDENT
ADVISING MANUAL

2018-2019

June 2018
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WELCOME

Welcome to the Robotics MSE program in the Laboratory for Computational Sensing and Robotics (LCSR)

This manual is designed to serve as a guide for graduate students in LCSR to work more effectively and to describe the basic academic requirements for the Robotics MSE degree. This manual covers policies, rules, and procedures, and offers suggestions regarding our program. The detailed planning of an academic program, such as choosing courses and the like must be done with the guidance of the academic advisor. Please note that like any complex program, the Robotics MSE is a living program and while the MSE manual is as accurate as possible, it is important that you clarify any unclear issues with your academic advisor and/or Robotics Academic Manager Alison Morrow. Also, please note it is the student's responsibility to read the entire MSE advising manual, and to take complete responsibility for fulfilling the academic and other graduate requirements. Your Advisor and the Robotics Academic Manager are there to help, answer questions, and offer suggestions but ultimately you must take ownership in your own degree program.
MSE DEGREE REQUIREMENTS

Course-Option: 10 full-time academic courses (each class at least 3 credits, e.g. not seminars, safety training, etc.).

Essay-Option: 8 full-time academic courses (each class at least 3 credits, e.g. not seminars, safety training, etc.) and a Master’s Essay supervised by a WSE faculty member who has been approved by the Robotics MSE Curriculum Committee to serve as an academic advisor. (See Essay Option section for more information)

At least 6 of these courses must be at the graduate level as defined by the offering department/center. All courses counted toward the MSE degree requirements must be at the 400 level or above. Any dual listed courses (i.e. listed at both the 600 and 400 level) must be taken at the 600 level. All courses counting towards the foundation, track, or elective requirements must be for a letter grade (i.e. no pass/fail). Any exceptions must be approved in writing by your academic advisor and the LCSR Education Director. Non-credit and one-credit courses such as the weekly seminar courses offered by LCSR may not count toward this course requirement.

MSE Core Courses
(2 courses and a seminar)

Two first year graduate level courses form the core of the Robotics MSE program. These courses can be taken in either order. Both classes are required.

601.663 Algorithms for Sensor-Based Robotics (3 credits)
This course surveys the development of robotic systems for navigating in an environment from an algorithmic perspective. It will cover basic kinematics, configuration space concepts, motion planning, and localization and mapping. It will describe these concepts in the context of the ROS software system, and will present examples relevant to mobile platforms, manipulation, robotics surgery, and human-machine systems.

530.646 Robot Devices, Kinematics, Dynamics, and Control (4 credits)
Graduate-level introduction to the mechanics of robotic systems with emphasis on the mathematical tools for kinematics and dynamics of robot arms and mobile robots. Topics include the geometry and mathematical representation of rigid body motion, forward and inverse kinematics of articulated mechanical arms, trajectory generation, manipulator dynamics, actuation, and design issues, manipulator control, and additional special topics. Recommended course background: multivariable integral and differential calculus, classical physics, linear algebra, ordinary differential equations. Programming: Knowledge of the Matlab programming language including data input/output, 1-D and 2-D arrays, and user-defined function calls. Students with experience with these language elements in other programming languages (C, C++, Python, Java, etc.) should be able to self-tutor themselves in the Matlab language as part of the programming exercises.

Note: WSE courses were renumbered in Spring 2017. Courses taken before Fall 2017 will have the legacy course numbering. If you are a combined student (i.e. graduated with your undergraduate degree from JHU) who took either of these required courses at the 400 level during your undergraduate course work, the classes can count as fulfilling the requirement. You will still need to fulfill the requirement of at least six (6) 600 level courses or above to complete the degree.
Seminar Course Requirement

Students are required to register for the following one-credit weekly robotics research seminar course every term in which they are in full-time residency:

500.745 Seminar in Computational Sensing and Robotics

If you have changed to part-time status, please talk to your academic staff about this requirement.

MSE Degree Track Requirements

(4 Courses)

Tracks consist of course sequences that provide the student with strength in a specific area. Track requirements are listed below. Other courses may be substituted only with the written approval of both the student’s academic advisor and the Robotics Education Director. Many of these courses are offered in multiple departments – alternative course numbers for the same class are acceptable substitutions. Please confirm with your advisor that you have signed up for the correct courses. Not all courses will necessarily be offered each semester or each year. **Note: Students should discuss their academic plan with their advisor. Specific choices are subject to approval of plan by advisor.** Courses counted towards the track requirement may not be used to satisfy the elective requirement.

Automation Science and Engineering Track

Choose four (4) courses from the following list. *Starred and bolded choices are strongly recommended.*

- 520.448 Electronics Design Lab *
- 520.657 Product Design Lab
- 520.662/520.663 Leading Innovation Design Team
- 520.738 Advanced Electronic Design Lab
- 530.414 Computer-Aided Design* 
- 530.420 Robot Sensors/Actuators
- 530.421 Mechatronics
- 530.495 Microfabrication Laboratory
- 530.645 Kinematics
- 530.649 System Identification
- 530.653 Advanced Systems Modeling
- 535.427 Computer Aided Design* (NOT to be counted if 530.414 is taken)
- 535.459 Manufacturing Systems Analysis*
- 535.473 Mechanized Assembly: Hardware and Algorithms
- 535.460 Precision Mechanical Design*
- 553.761 Nonlinear Optimization 1
- 553.762 Nonlinear Optimization 2
- 553.663 Network Models in Operations Research
- 601.661 Computer Vision

**Note: at most two EP Courses (535.xxx.xx) can be counted toward the MSE with approval of advisor.**
### BioRobotics Track

Choose four (4) courses from the following list.  
*Starred and bolded choices are strongly recommended.*

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>520.621</td>
<td>Introduction to Nonlinear Systems</td>
</tr>
<tr>
<td>530.485</td>
<td>Physics and Feedback in Living Systems</td>
</tr>
<tr>
<td>530.639</td>
<td>Comparative Biomechanics</td>
</tr>
<tr>
<td>530.649</td>
<td>System Identification</td>
</tr>
<tr>
<td><strong>530.675</strong></td>
<td>Locomotion I: Mechanics*</td>
</tr>
<tr>
<td><strong>530.676</strong></td>
<td>Locomotion II: Dynamics*</td>
</tr>
<tr>
<td>530.691</td>
<td>Haptic Interface Design for Human-Robot Interaction</td>
</tr>
<tr>
<td>580.630</td>
<td>Theoretical Neuroscience</td>
</tr>
<tr>
<td>530.616/580.616/520.601</td>
<td>Introduction to Linear Systems</td>
</tr>
</tbody>
</table>

### Control and Dynamical Systems Track

Choose four (4) courses from the following list.  
*Starred and bolded choices are strongly recommended.*

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>520.621</strong></td>
<td>Introduction to Nonlinear Systems*</td>
</tr>
<tr>
<td>520.629</td>
<td>Networked Dynamical Systems</td>
</tr>
<tr>
<td>520.633</td>
<td>Intro to Robust Control</td>
</tr>
<tr>
<td>530.603</td>
<td>Applied Optimal Control</td>
</tr>
<tr>
<td>530.624</td>
<td>Dynamics of Robots and Spacecraft</td>
</tr>
<tr>
<td>530.647</td>
<td>Adaptive Systems</td>
</tr>
<tr>
<td>530.649</td>
<td>System Identification</td>
</tr>
<tr>
<td>530.653</td>
<td>Advanced Systems Modeling</td>
</tr>
<tr>
<td>530.654</td>
<td>Advanced Systems Modeling II</td>
</tr>
<tr>
<td>530.676</td>
<td>Locomotion II: Dynamics</td>
</tr>
<tr>
<td><strong>530.678</strong></td>
<td>Nonlinear Control and Planning in Robotics*</td>
</tr>
<tr>
<td>530.761</td>
<td>Mathematical Methods of Engineering I</td>
</tr>
<tr>
<td>553.792</td>
<td>Matrix Analysis</td>
</tr>
<tr>
<td>553.797</td>
<td>Intro to Control Theory and Optimal Control</td>
</tr>
<tr>
<td>530.616/580.616/520.601</td>
<td>Introduction to Linear Systems Theory*</td>
</tr>
</tbody>
</table>
**Medical Robotics Track**

Two (2) required courses and two (2) courses from the following list.

**Required for the track:**
- 601.655  Computer-Integrated Surgery 1
- 601.656  Computer-Integrated Surgery 2

**Choose two (2) of the following:**
- 520.613  Adv Topics in Optical Medical Imaging
- 520.623  Medical Image Analysis
- 520.631  Ultrasound and Photoacoustic Beamforming
- 520.632  Medical Imaging Systems
- 530.420  Robot Sensors/Actuators
- 530.691  Haptic Interface Design for Human-Robot Interaction
- 530.761  Mathematical Methods of Engineering I
- 580.673  Magnetic Resonance in Medicine
- 580.679  X-ray Imaging and Computed Tomography
- 580.684  Ultrasound Imaging: Theory and Applications
- 580.693  Imaging Instrumentation
- 601.654  Augmented Reality
- 601.661  Computer Vision
- 601.676  Machine Learning: Data to Models

**Perception and Cognitive Systems Track**

Choose four (4) courses from the following list.

*Starred and bolded choices are strongly recommended.*

- 520.614  Image Processing and Analysis
- 520.615  Image Process and Analysis II
- 520.646  Wavelets and Filter Banks
- 530.420  Robot Sensors/Actuators
- 530.421  Mechatronics
- 530.691  Haptic Interface Design for Human-Robot Interaction
- 530.707  Robot System Programming
- 553.693  Mathematical Image Analysis
- 553.761  Nonlinear Optimization 1
- 553.762  Nonlinear Optimization 2
- 580.630  Theoretical Neuroscience
- 601.654  Augmented Reality
- **601.661  Computer Vision***
- **601.664  Artificial Intelligence***
- 601.675  Machine Learning
- 601.682  Machine Learning: Deep Learning
- 601.691  Human-Robot Interaction
- 601.760  FFT in Graphics and Vision
- 601.783  Vision as Bayesian Inference
General Robotics Track

Choose four (4) courses from the following list.

520.621  Intro to Nonlinear Systems
520.633  Intro to Robust Control
520.662/520.663  Leading Innovation Design Team
530.420  Robot Sensors/Actuators
530.421  Mechatronics
530.603  Applied Optimal Control
530.624  Dynamics of Robots and Spacecraft
530.645  Kinematics
530.647  Adaptive Systems
530.648  Group Theory in Engineering Design
530.649  System Identification
530.653  Advanced Systems Modeling
530.654  Advanced Systems Modeling II
530.675  Locomotion I: Mechanics
530.676  Locomotion II: Dynamics
530.678  Nonlinear Control and Planning in Robotics
530.691  Haptic Interface Design for Human-Robot Interaction
530.707  Robot Systems Programming
530.761  Mathematical Methods of Engineering I
553.761  Nonlinear Optimization 1
553.762  Nonlinear Optimization 2
553.792  Matrix Analysis
553.797  Intro to Control Theory and Optimal Control
601.654  Augmented Reality
601.655  Computer-Integrated Surgery 1
601.656  Computer-Integrated Surgery 2
601.661  Computer Vision
601.664  Artificial Intelligence
601.675  Machine Learning
601.691  Human-Robot Interaction
530.616/580.616/520.601  Introduction to Linear Systems Theory
MSE Degree Electives Courses

(Four (4) Courses or Two (2) Courses + MSE Essay)

Any engineering or quantitative (designated E or Q in the course catalog) course, subject to the degree requirement limitations, including but not limited to: all courses counted toward the MSE degree requirements must be at the 400 level or above. Any dual listed courses (i.e. listed at both the 600 and 400 level) must be taken at the 600 level. Any exceptions must be approved in writing by your academic advisor. All electives must be at least 3 credits. Electives include, but are not limited to, the following:

- 520.623 Medical Image Analysis
- 520.632 Medical Imaging Systems
- 520.657 Product Design Lab
- 520.662/520.663 Leading Innovation Design Team
- 520.683 Bio-Photonics Laboratory
- 520.691 CAD Design of Digital VLSI Systems I
- 530.414 Computer-Aided Design
- 530.420 Robot Sensors/Actuators
- 530.421 Mechatronics
- 530.495 Microfabrication Lab
- 530.624 Dynamics of Robots and Spacecraft
- 530.628 Nonlinear Dynamical Systems
- 530.647 Adaptive Systems
- 530.649 System Identification
- 530.653 Advanced Systems Modeling
- 530.675 Locomotion I: Mechanics
- 530.676 Locomotion II: Dynamics
- 530.678 Nonlinear Control and Planning in Robotics
- 530.707 Robot Systems Programming
- 530.761 Mathematical Methods of Engineering I
- 553.761 Nonlinear Optimization 1
- 553.762 Nonlinear Optimization 2
- 553.663 Network Models in Operations Research
- 601.691 Human-Robot Interaction
- 601.655 Computer Integrated Surgery 1
- 601.656 Computer Integrated Surgery 2
- 601.661 Computer Vision
- 601.664 Artificial Intelligence
- 601.675 Machine Learning
- 601.682 Machine Learning: Deep Learning
- 601.760 FFT in Graphics and Vision
- 601.783 Vision as Bayesian Inference

Courses counted towards the track requirement may not be used to satisfy the elective requirement.
**Master's Essay**

Many students elect to take the Course Option. In some cases, with the approval of a research advisor, the Essay Option may be used to fulfill the MSE Robotics degree requirements. In the Course Option, ten (10) courses must be taken as articulated above. For the Essay Option, eight (8) courses must be taken, and research must be performed leading to a formal MSE Essay. Degree Track requirements are the same for both the Course and Essay Options. For more information on how to apply for the essay option, please see the advising section below.

**Additional Required Courses**

Every effort should be made to take these within the first semester.

*Academic Ethics (EN.500.603)*

Online tutorial required for all incoming MSE students. Auto-enrolled in first semester.

*Opiod Training*

Required for all incoming MSE students. Auto-enrolled in first semester.

*Research Laboratory Safety (EN.500.601)*

Required for all incoming MSE students.

*Responsible Conduct of Research course*

AS.360.624 (online) required for all incoming MSE students. Instructions for registering: [http://engineering.jhu.edu/wse-research/resources-policies-forms/responsible-conduct-of-research/online-training-course-for-the-responsible-conduct-of-research/](http://engineering.jhu.edu/wse-research/resources-policies-forms/responsible-conduct-of-research/online-training-course-for-the-responsible-conduct-of-research/)

AS.360.625 (in-person) may be required for certain research projects.

More information on this policy: [http://eng.jhu.edu/wse/page/conduct-of-research-training](http://eng.jhu.edu/wse/page/conduct-of-research-training).

*Title IX training*

Required for all incoming MSE students. Auto-enrolled in first semester.

**ACADEMIC POLICIES**

Please read through all of the policies. It is your responsibility to adhere to all requirements and policies.

**Academic Performance Requirements**

Course Grade Requirement: A course is satisfactorily completed if a grade from A+ to C- is obtained. No more than one C+, C, or C- can be counted toward the degree requirements. A grade of D or F or a second C+, C, or C- grade results in probation. A second D or F, or a third C+, C, or C- grade typically results in termination from the program.
Audit Courses
Students may audit courses with the approval of their advisor. Credit hours from courses that are audited do not count towards full-time status. The Robotics program follows all standard WSE policies regarding auditing: [https://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/](https://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/) (Information under Homewood Grade and Registration Change Guidelines.) This includes: “Changing a course registration from “Audit” [student receives no letter grade] to “Credit” [student receives letter grade], or from “Credit” to “Audit” is permissible during the Office of the Registrar’s official add/drop dates. Registration changes beyond this deadline are not permissible. Changing a final grade (“A” through “F”, “Pass”), “Incomplete” grade, “In-Progress” grade or “Missing” grade to “Audit” is not permissible at any time.”

Double Counting
Standard WSE policy and limitations on double counting apply: [http://eng.jhu.edu/wse/page/graduate-double-counting](http://eng.jhu.edu/wse/page/graduate-double-counting). Below is a basic description of the double-counting policy, for information purposes only; the official WSE policy is on the website above, and the Robotics M.S.E. program adheres to that policy.

Coursework applied to a bachelor's degree:
Students either in a WSE combined (bachelor’s/master's) program or seeking a WSE master's degree after having earned a WSE or Krieger School of Arts and Sciences bachelor’s degree may double-count two (2) courses (400-level or higher) to both programs with the permission of the master's academic advisor. WSE master's degree candidates may not double-count courses applied to a bachelor's degree earned at a different institution.

Coursework not applied to a bachelor's degree:
For students who are either in a WSE combined bachelor's/master's degree program or have already earned a Whiting School of Engineering or Krieger School of Arts and Sciences bachelor's degree and are seeking a WSE master's degree, any graduate-level coursework (as defined by the WSE graduate program) not applied to the undergraduate degree may be applied to the graduate degree, regardless of when that course was taken (i.e., before or after the undergraduate degree has been conferred) with the permission of the master's academic advisor.

Note: If you are planning on double counting any courses (ex. If you are a combined student who took graduate courses while still an undergraduate at JHU), it is your responsibility to understand the double counting policy. Make sure to read the policy, and if you have any questions, contact the academic staff in Robotics.

Duration (Time to Completion Limit)
Typical time to completion is 1.5 to 2 years, depending on student pace. Students must complete degree within 5 years from matriculation in the M.S.E. program. A university-approved leave of absence does not count toward this limit.
**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.

Please consider the following, which has previously been published on the Whiting School of Engineering Academic Affairs website: “An ethical campus fosters a positive sense of community and trust, while unethical actions and attitudes breed suspicion, cynicism, and negativity. Johns Hopkins University strives to be a community in which honesty and respect are valued and upheld, and in which all members of the community uphold the highest degree of ethical conduct.

“Academic ethics is the responsibility of every student, faculty member, and staff person at Johns Hopkins University. You must take the time to learn about what is ethical and what is not - ignorance of ethical rules is not an excuse for cheating. If you see a violation take place, it is your responsibility to report it.

“Every class you take at Hopkins should address ethics, and some activities that are allowed in one class may not be allowed in another class. If you are not sure if an action is ethical for a particular class, e.g. working in a group on homework, read the syllabus carefully and ask your professor.”

*Examples of Academic Misconduct:*
Cheating
Plagiarism
Reusing Assignments
Improper Use of the Internet
Improper Use of Electronic Devices
Unauthorized Collaboration
Alteration of Graded Assignments
Forgery and Falsification
Lying
Facilitating Academic Dishonesty
Unfair Competition

Information about academic policies of the Whiting School of Engineering can be found at [http://homewoodgrad.jhu.edu/academics/academic-ethics-and-misconduct/](http://homewoodgrad.jhu.edu/academics/academic-ethics-and-misconduct/) and [http://homewoodgrad.jhu.edu/academics/policies/](http://homewoodgrad.jhu.edu/academics/policies/). Please read them.
Graduate Research Courses

Coursework Option
No more than one 1-semester graduate research course (e.g. 530.600) may be counted toward degree requirements. To substitute for a class, the graduate research course must be at least 3 credits.

Essay Option
While a student may be required to sign up for graduate research courses while working on the master’s essay, these research courses may not count towards the 8 required courses for the essay option.

Laboratory Safety
Lab Safety is the responsibility of all who use, maintain, or visit the labs within LCSR. 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.

Please also visit the Whiting School’s Lab 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 PIs for each lab are listed on the entrance door to each lab.

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.

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 here:  
http://homewoodgrad.jhu.edu/academics/graduate-board/new-grad-board-residency-page/.

Information about part-time status can be found here: http://e-catalog.jhu.edu/grad-students/academic-policies/#studentenrollmentstatusetext In most cases, students can only be part-time in their final semester, with approval of the program and OIS (when appropriate). If you have any questions, please contact Alison Morrow.

**Transfer Courses**

Standard WSE policy and limitations on M.S.E. transfer credits apply (http://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/). In addition, use of each transfer course toward satisfaction of a specific Robotics M.S.E. degree requirement must be approved in writing by both the student’s academic advisor and the Robotics M.S.E. Graduate Director.

**WSE Engineering Management Courses**

Two (2) 1.5 credit hour courses taken for credit (i.e. a letter grade) may count towards one class of the MSE degree elective requirements if they are pre-approved in writing by the student’s academic advisor.

**WSE Engineering for Professionals (EP) Courses**

Up to two (2) EP courses may count toward the MSE degree elective requirements if they are pre-approved in writing by the student’s academic advisor.

**Additional policies**

*Whiting School of Engineering:*
http://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/

*Homewood Graduate policies and resources:*
http://homewoodgrad.jhu.edu/

*Course Catalog:*
http://e-catalog.jhu.edu/
**ADVISING**

**MSE Academic Advising**
All incoming MSE students will be assigned an MSE Academic Advisor. Advising appointments are your opportunity to plan your academic career and track your academic progress. You should meet with your advisor at least once a semester, to plan your courses for your next semester.

When planning for your advising meeting, you should fill out the Robotics Advising Worksheet, located here: [http://lcsr.jhu.edu/robotics-mse-academic-resources/](http://lcsr.jhu.edu/robotics-mse-academic-resources/), which helps chart the progress you have already made and which classes you plan on taking.

**NOTE:** You are required to bring a completed Advising Worksheet (along with any questions you have for your advisor) to each and every advising meeting; advisors reserve the right to refuse to meet with you or release your hold until you have completed this form. This means that you **must select all courses in advance of your first semester**. Of course, as time goes on you may end up selecting different courses for future semesters, but planning ahead is crucial to the success of your program.

These are some best practices for preparing to get the most out of your advising process:

1. Read this advising manual cover to cover.
2. Make a list of courses of interest, then introspect in to SIS for previous years to know which term (spring / fall) the course is typically offered.
3. Check prerequisites of all courses and make sure to fulfill them before the course of interest.
4. Fill out both tabs (course list and term-by-term) in the Advising Worksheet.
5. Repeat 2-4 (revise) every term.

Note that in Fall 2017, there was widespread updating of course numbering in order to improve consistency across departments. This makes it somewhat harder to use SIS to perform retrospective analysis because one must use the course NAMES and DEPARTMENTS, not COURSE NUMBERS, for historical purposes.

**MSE Essay Advising**
In some cases, with the approval of a research advisor, the Essay Option may be used to fulfill the MSE Robotics degree requirements. In the standard Course Option, ten (10) courses must be taken as articulated herein. For the Essay Option, eight (8) courses must be taken, and research must be performed leading to a formal MSE Essay. Degree Track requirements (see below) are the same for both the Course and Essay Options.

Primary Robotics MSE Essay / Research Advisor Requirements: Research advisors for all Robotics MSE Theses must be approved in advance by the Robotics MSE Graduate Director.

School of Engineering MSE Essay Advisor Requirement: To partially fulfill the degree requirement, the Essay must be approved and signed by the primary research advisor. If the primary advisor is not a
A robotics faculty member holding primary appointment in the Whiting School of Engineering, a second advisor (who satisfies this requirement) must also read and sign the essay.

1. To qualify for the essay option, fill out and submit and Essay Advisor/Advisee Mutual Work Agreement form at least two weeks before the beginning of your research. In the extremely unlikely event that you need to change advisors mid-research, please contact Alison Morrow.

2. It is recommended that students meet with their essay advisors to develop a timeline for research and essay writing, and that portions of the essay be written as the research proceeds. For example, the introduction, background, and motivation for the research can and should often be written in the very early stages of the research. It is highly recommended that the student and advisor choose a second reader to review the essay. At least one reader must be a primary faculty in LCSR, and have their primary appointment in the Whiting School, or be approved by the Robotics Curriculum Committee.

3. Register for Essay Research classes
   - These are in the home department of your research advisor (for example: if your research advisor is Noah Cowan, then you would sign up for the Mechanical Engineering course Master’s Research: EN.530.600).
   - If you are on non-resident status, sign up for the Non-Resident Course instead: EN.910.600
   - If you have any questions about this requirement, confirm you are signed up for the correct course with Alison Morrow.

4. Your essay must be submitted to your advisor for edits at least four weeks before the Robotics essay submission deadline

5. The final version of the master’s essay must be submitted, with the cover page signed by the student’s advisor, to the LCSR Administrative Office and EDT (Electronic Theses and Dissertation staff) by the essay completion date. See Alison Morrow for updated deadline information.

Graduate Student Annual Reviews
A written review of all master’s students is required. The review process includes the opportunity for a student to offer a self-evaluation to discuss with his or her advisor. If the student is completing an MSE Essay, the student is expected to hold an annual review with both the research advisor and the academic advisor, to ensure that the student is staying on track on both academics and research.

The Graduate Program Committee has created a review form, found here: http://lcsr.jhu.edu/robotics-mse-academic-resources/

Before the second week of class in the Spring semester, usually the first week in February, all master’s students must complete this form and discuss it with their advisor. The student and advisor will both sign the review, which must be submitted to the Robotics academic staff.

The greatest benefit of this review will no doubt come from the student–advisor meetings, but the completed reviews are also structured to provide the center with a meaningful measure of the progress that our students are making.
GRADUATION

Academic Deadlines
Students preparing to complete a degree program in a given semester should see Alison Morrow 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 certification material usually fall within the following time periods:
Fall – early October
Spring – early March
Summer – mid-July

Essays deadlines are later – please check with Alison Morrow for current deadlines. Students who have not completed their requirements by the first day of classes must register for the current semester.

To Graduate
1. Submit Intent to Graduate form through ISIS by the posted deadline.
2. Fill out the degree checkout sheet, which can be found here: http://lcsr.jhu.edu/robotics-mse-academic-resources/.
3. Review with your advisor, who signs the form.
4. Attach a copy of your unofficial transcript to the form.
5. For combined students only: attach copies of your undergraduate transcript and your undergraduate checkout sheet to the form.
6. If you are transferring courses from another university: attach a copy of the other university’s transcript to the form.
7. Return the form to Alison Morrow (alison.morrow@jhu.edu) in 200 Hackerman Hall by the advertised deadline.
8. If you are finishing the essay option, the cover page of the essay must be signed by the student’s essay advisor. Copies of the essay must be submitted to Robotics academic staff and ETD (Electronic Theses and Dissertation staff) by the essay completion date, which is advertised here: http://lcsr.jhu.edu/robotics-mse-academic-resources/

ETD submission instructions are here: http://guides.library.jhu.edu/etd
Note that there is a fee to submit your essay.
RESOURCES

Center for Leadership Education
The Center for Leadership Education provides many classes in engineering management, English as a second language, and professional communication. While these courses will not count towards the Robotics MSE, they can be useful. Please note: these classes will end up on your transcript, so the grades are important.

More information can be found here: http://engineering.jhu.edu/cle/programs-minors/

Financial Aid
The Office of Student Financial Services has other financial aid sources available, 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://www.jhu.edu/finaid/grads.html.

Information Technology
The Information Technology Department at Johns Hopkins, whose web site is located at http://it.jhu.edu is the online resource for all 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.

Libraries
The JHU Libraries are extensive, both on-ground and online. The Sheridan Libraries, on the Homewood campus, include quiet room, group study rooms, and a café. Library resources can be found here: http://www.library.jhu.edu.

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.

- Secure your computers, especially laptops!
- 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.

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.

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. The Student Employment Services office is located in the basement of Garland Hall, and their website is located at http://www.jhu.edu/stujob/.

Graduate Student Organizations
Johns Hopkins has many student organizations. A list of some that are specifically geared to graduate students can be found here: http://homewoodgrad.jhu.edu/life-at-hopkins/graduate-student-organizations/

In addition, the Graduate Representative Organization (GRO) can be found here: http://studentaffairs.jhu.edu/gro/. The GRO maintains a list of student groups, which can be found here: http://studentaffairs.jhu.edu/gro/clubs-groups/list-of-groups/
LCSR FACULTY

Mehran Armand, Ph.D.
Associate Research Professor
Dept. of Mechanical Engineering
Principal Staff
Applied Physics Laboratory
marmand2@jhu.edu

Muyinatu Bell, Ph.D.
Assistant Professor
Dept. of Electrical and Computer Engineering
muyinatu.ledijubell@jhu.edu

Emad Docter, Ph.D.
Assistant Professor
Dept. of Radiology
410-516-6778
eboctor1@jhmi.edu

Jeremy D. Brown, Ph.D.
Assistant Professor
Dept. of Mechanical Engineering
410-516-6782
jbrown262@jhu.edu

Gregory S. Chirikjian, Ph.D.
Professor
Dept. of Mechanical Engineering
Deputy Director, LCSR
410-516-7127
gchirik1@jhu.edu

Noah Cowan, Ph.D.
Professor
Dept. of Mechanical Engineering
410-516-5301
ncowan@jhu.edu

Ralph Etienne Cummings, Ph.D.
Professor and Chair
Dept. of Electrical and Computer Engineering
410-516-3494
retienne@jhu.edu

Dennice Gayme, Ph.D.
Associate Professor
Dept. of Mechanical Engineering
410-516-5784
dennice@jhu.edu

Gregory D. Hager, Ph.D.
Professor
Dept. of Computer Science
410-516-5521
hager@jhu.edu

Chien-Ming Huang, Ph.D.
Assistant Professor
Dept. of Computer Science
cmhugan@cs.jhu.edu

Iulian Iordachita, Ph.D.
Associate Research Professor
Dept. of Mechanical Engineering
410-516-3839
iordachita@jhu.edu

Jin Kang, Ph.D.
Professor
Dept. of Electrical and Computer Engineering
410-516-7031
jkang@jhu.edu

Peter Kazanzides, Ph.D.
Research Professor
Dept. of Computer Science
410-516-5590
pkaz@jhu.edu

Marin Kobilarov, Ph.D.
Assistant Professor
Dept. of Mechanical Engineering
mkobila1@jhu.edu

Simon Leonard, Ph.D.
Assistant Research Professor
Dept. of Computer Science
sleane@jhu.edu

Chen Li, Ph.D.
Assistant Professor
Dept. of Mechanical Engineering
410-516-4948
chen.li@jhu.edu

Enrique Mallada, Ph.D.
Assistant Professor
Dept. of Electrical and Computer Engineering
410-516-8650
mallada@jhu.edu

Nassir Navab, Ph.D.
Research Professor
Dept. of Computer Science
410-516-2004
nnabab1@jhu.edu

Jerry Prince, Ph.D.
Professor
Dept. of Electrical and Computer Engineering
410-516-5192
prince@jhu.edu

Russell H. Taylor, Ph.D.
Professor
Dept. of Computer Science
Director, LCSR
410-516-6299
rht@jhu.edu

Rene Vidal, Ph.D.
Professor
Dept. of Biomedical Engineering
410-516-7306
rvidal@jhu.edu

Louis Whitcomb, Ph.D.
Professor
Dept. of Mechanical Engineering
410-516-6724
llw@jhu.edu
LCSR ADMINISTRATIVE STAFF

Lorrie Dodd
Administrative Manager
207 Hackerman Hall
(410) 516-0740
ldodd@jhu.edu

Alison Morrow
Robotics Academic Manager
200 Hackerman Hall
(410) 516-4639
alison.morrow@jhu.edu

Jordan Card
Budget Specialist
200 Hackerman Hall
410-516-3837
jcard4@jhu.edu

Julia Ortiz-Foy
Research Service Analyst
314A Hackerman Hall
(410) 516-0242
jortiz@jhu.edu

Ashley Moriarty
Administrative Coordinator
200 Hackerman Hall
410-516-6841
AshleyMoriarty@jhu.edu

Robert Schulze
Sr. Research Service Analyst
313 Hackerman Hall
(410) 516-0265
rschulze@jhu.edu

Important Education Contacts

Gregory S. Chirikjian, Ph.D.
Professor
Dept. of Mechanical Engineering
Deputy Director, LCSR
410-516-7127
gchirik1@jhu.edu

Christine Kavanagh
Assistant Dean for Graduate and Postdoctoral Academic Affairs
410-516-0777
christinekavanagh@jhu.edu

Alison Morrow
Robotics Academic Manager
(410) 516-4639
alison.morrow@jhu.edu