JOHNS HOPKINS

WHITING SCHOOL
of ENGINEERING

Two-Semester Thesis Option
Master of Science or Post-Master's Certificate
in
Electrical and Computer Engineering

JHU Engineering for Professionals

Background

The Electrical and Computer Engineering (ECE) program offers motivated students the opportunity to do in-depth research and development through the two-semester thesis option. The discussion below summarizes the requirements that students and faculty are to follow relative to the thesis option. Sections 1 – 3 summarize the requirements as they apply to either the Master of Science (MS) degree or the Post-Master's Certificate (PMC). Section 4 spells out the step-by-step procedure to be followed by students and research advisers. Section 5 is the list of ECE faculty available to serve as research advisers while Section 6 provides the contact information for the ECE leadership team. The Appendix gives the catalog descriptions for the thesis courses.

1. Requirements for MS Degree in ECE

Ten graduate courses must be completed within five years. At least seven of the ten courses must be from the Electrical and Computer Engineering program (525.xxx) or the Department of Electrical and Computer Engineering (520.xxx) in the full-time program, and at least four of the ten required courses must be at the 700-level or above. Approved transfer courses count as 600-level courses. At most, three of the ten courses required for the MS degree may be selected from outside the program, subject to advisor approval.

If the student pursues the thesis option, the two-course sequence 525.803-804 Electrical and Computer Engineering Thesis may replace two of the four required 700-level courses.

2. Requirements for PMC in ECE

Six graduate courses must be completed within three years. At least four of the six courses must be from the Electrical and Computer Engineering (525.xxx) program or the Department of Electrical and Computer Engineering (520.xxx) in the full-time program. Students are allowed to take two electives. All course selections are subject to advisor approval.

If the student pursues the thesis option, the two-course sequence 525.803-804 Electrical and Computer Engineering Thesis may replace two of the four required ECE courses.

3. Thesis Requirements and Deliverables

It is required that the thesis research be applied or theoretical work that goes beyond a straightforward implementation of known methods. The intent of the research is to expand the body of knowledge in the broad area of electrical and computer engineering. Students may pursue the thesis option after completing all other requirements for their MS degree or PMC.

Each thesis project is to be guided by a research adviser, chosen from ECE Research Faculty below (the research adviser may be different from the student's academic adviser assigned at admission to the ECE Program). In addition, each student is required to select a thesis committee that consists of the research adviser, a member of the ECE leadership team, and a third member to provide an independent opinion on the research and the associated documentation. This third member may be any member of the technical community (Johns Hopkins or elsewhere) who has deep knowledge in the area of the research and is subject to approval by the thesis adviser, academic adviser, and ECE Program Chair.

The final deliverable is an electronic thesis submission to the Milton S. Eisenhower Library following standards posted at http://guides.library.jhu.edu/etd. See additional requirements for the final deliverable below.

A professional-quality thesis defense presentation is also required. The defense is to be scheduled near the end of the project, but prior to the assignment of the final grade. The presentation must be open to the public and the audience must include the members of the thesis committee.

4. Thesis Proposal Process

Students and research advisers are to follow the steps below:

1. The student contacts a potential research adviser from within the ECE Research Faculty below. The student may approach the adviser with either a project in mind or with the intention of soliciting suggestions for a topic from the adviser.

2. After choosing a topic, the student selects the other members of the thesis committee, to consist of a member of the ECE leadership team and a third member to provide an independent opinion on the research and the associated documentation. This third committee member is expected to be available for consultation throughout the duration of the research work and is expected to read and comment on the draft documentation produced near the end of the project.

3. After settling on the committee members and a potential topic, the student conducts a thorough literature survey to identify related work and to clarify precisely what is known and not known about the potential area of study. The goal is to identify topics that would be new or add to the volume of knowledge and understanding in the areas of electrical and computer engineering.

4. After settling on a topic of study, the student writes a research proposal of approximately two-to-three pages. The proposal must identify both the research adviser and the other members of the thesis committee. The proposal must clearly discuss the problem motivation, what the student intends to accomplish, and why the research will

be an original contribution to the field using knowledge gained from the literature survey in step 3 above. The proposal is to also discuss the plans for final documentation including mention of likely coauthors (if any) beyond the student and his/her adviser.

5. The thesis committee endorse the proposal and forward it to the academic adviser for approval, who then forwards the proposal to the Program Chair for final approval. After final approval, the proposal and communication chain of approvals are added to the student's academic file.

6. Given the approved proposal and registration in the appropriate course (525.803), the research plan in the proposal is implemented by the student with an expectation of at least biweekly contact with the research adviser. Registration in this course cannot occur until the proposal is approved (step 5 above).

7. At the end of the first semester, the student shall schedule a status update presentation at a time and location of convenience to the student and the thesis committee (a synchronous online meeting is acceptable). If there are unique challenges or problems, these should be mentioned as part of the status update presentation. The status update presentation should provide a clear indication of what needs to be done to ensure completion of the project by the end of the second semester. The research adviser will assign a grade for the first semester based, in part, on this status update presentation.

8. Given success in the first semester, the student enrolls in 525.804 and continues the research. Ideally, a final defense and corresponding deliverable are to be completed by the end of the second semester. The defense is to be scheduled at a time and location of convenience to the student and thesis committee (a synchronous online meeting is acceptable). The academic adviser should also be informed about the defense. The final thesis must take account of relevant comments or questions that arise during the defense. Note: If the final electronic thesis has not been submitted to the MSE library by the end of the second semester, the research adviser may assign an "I" [incomplete] grade until all conditions are met.

9. A final message that certifies the satisfactory completion of the defense presentation and the thesis is sent by the research adviser to the academic adviser and the Program Chair together with a copy of the final thesis. If the final thesis includes authors other than the student, the adviser must discuss the student's role relative to that of the other authors; the final message must certify that the student is the primary contributor (over 50 percent) to both the technical work and the writing of the thesis. The Program Chair gives the final approval and the research adviser then assigns the final grade to the relevant course. The approval message from the Chair to the research adviser and the final thesis are placed in the student's academic file and to the MSE Library. If the research adviser assigned an "I" grade for reasons discussed in item 8 above, the submission of the approved checklist and final thesis for the student's academic file should be delayed until the adviser is ready to assign a final letter grade.

5. ECE Research Faculty

The following ECE faculty members are available to supervise two-semester thesis projects.

Name	Contact Info	Courses Taught in ECE	Areas of Specialization	Comments
Nicholas Beser	Nick.Beser@jhuapl.edu	525.612 Computer Architecture; 525.759 Image Compression, Packet Video and Video Processing	Computer Architecture and Video Processing (including Media Forensics)	Student expected to have taken a course from the instructor prior to research
Harry Charles	harry.charles@jhuapl.edu	525.606 Electronic Materials 525.607 Electronic Packaging 525.621 Intro. to Electronics & Solid State	Electronic Packaging Materials & Reliability Semiconductor Physics Hardware Fabrication	Prior class experience with student desirable, but not necessary.
Brian Choi	Brian.Choi@jhuapl.edu	525.616 Communication Systems Engineering	Communications and Networks	Student expected to have taken a course from the instructor prior to research
Cleon Davis	Cleon.Davis@jhuapl.edu	625.201 General Applied Mathematics; 625.690 Computational Complexity	Intelligent systems (neural networks, genetic algorithms, fuzzy logic)	
Ashutosh Dutta	Ashutosh.Dutta@jhuapl.edu	525.678/605.578 Next Generation Wireless Networks with 5G	Security, Virtualization, Mobility, SDN	Student is expected to have familiarity with communications, networking, and wireless
Robert Fry	Robert.fry@jhuapl.edu	525.414 Probability and Stochastic Processes, 525.430 DSP Laboratory	Digital Signal Processing, Bayesian Signal Processing, Probability Theory and Algorithm Design	
A. Roger Hammons Jr.	roger.hammons@verizon.net	525.707 Error Control Coding; 525.708 Iterative Methods	Communication Systems especially Physical Layer	Student expected to have taken a course from the instructor prior to research.
Jeff Houser	jghouser@gmail.com, (301) 394-0797	525.624 Analog Electronic Circuit Design; 525.654 Communications Circuits Laboratory; 525.732 Advanced	Analog Circuit Design, Embedded Systems, Communications Engineering	

		Analog Electronic Circuits; 525.743 Embedded Systems Development Laboratory		
Daniel Jablonski	Dan.Jablonski@jhuapl.edu	525.645 Modern Navigation Systems; 525.778 Design for Reliability, Testability, and Quality Assurance; 525.783 Spread Spectrum Communications; 525.789 Digital Satellite Communications	Microwave systems and communications, including radio navigation, GPS, broadband wireless and cellular, satellite communications, and aircraft avionics systems	Student expected to have taken a course from the instructor prior to research
Brian Jennison	Brian.Jennison@jhuapl.edu	525.202 Signals & Systems; 525.627 Digital Signal Processing	Signal Processing	Student expected to have taken a course from the instructor prior to research
Tim Miller	Timothy.miller@jhuapl.edu	525.746 Image Engineering	Imaging, Optical Sensors, Image Processing Algorithms	
Neil F. Palumbo	Npalumb1@jhu.edu	525.609 Continuous Control Systems; 525.770 Intelligent Algorithms	Control and Estimation; Intelligent Systems	Student expected to have taken a course from the instructor prior to research
Ramsey Hourani	Ramsey.Hourani@jhuapl.edu	525.642: FPGA Design Using VHDL	FPGA Design	Student expected to have taken a course from the instructor prior to research
John Samsundar	John.samsundar@jhuapl.edu	525.745 Applied Kalman Filtering; 525.744 Passive Emitter Geo-Location	Tracking/Geolocating via Sensor Fusion; Sensor Scheduling; Machine Learning	

6. ECE Leadership Team

Chair

Ashutosh Dutta, PhD
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Vice Chair

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Program Manager

Ramsey Hourani, PhD
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Appendix

Below are catalog descriptions for the thesis courses. Students pursuing the thesis option for either an MS degree or Post-Master's Certificate are required to register for these courses. The relevant sequence below may be used to fulfill two courses within the 700-level course requirements for the ECE MS degree.

525.803-804 Electrical and Computer Engineering Thesis

The two-course sequence 525.803-804 are designed for students in the Electrical And Computer Engineering (ECE) graduate program who wish to undertake a thesis project after completing all other requirements for their degree or post-master's certificate. Students work with an advisor to conduct independent research and development in ECE, leading to a written thesis and oral presentation to a thesis committee. The intent of the research is to advance the body of knowledge in one of the technology areas in the ECE program.

Prerequisites: Completion of all other courses applicable to the ECE graduate degree or post-master's certificate and approval of the ECE program chair. The thesis option is appropriate for highly motivated students with strong academic records.

Course Notes: Students accepted into this course will have off-hours access to ECE facilities at the Applied Physics Laboratory, as needed. A limited amount of support for research materials is available.

Instructor: Member of ECE Research Faculty