



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

Updated April 2024

## 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 advisors. Section 5 is the list of ECE faculty available to serve as research advisors 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 technical electives. 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

Five graduate courses must be completed within five years. At least four of the five 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. At least two of the four required Electrical and Computer Engineering courses must be 700-level. Students are allowed to take one elective. 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 advisor, chosen from ECE Research Faculty

below (the research advisor may be different from the student's academic advisor assigned at admission to the ECE Program). In addition, each student is required to select a thesis committee that consists of the research advisor, a second reader, and a third reader to provide independent opinions on the research and the associated documentation. One reader must be a part of the Johns Hopkins University community and the other readers may be any member of the technical community (Johns Hopkins or elsewhere) who has deep knowledge in the area of research. Both readers are subject to approval by the thesis advisor, academic advisor, 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 advisors are to follow the steps below:

1. The student contacts a potential research advisor from within the ECE Research Faculty below. The student may approach the advisor with either a project in mind or with the intention of soliciting suggestions for a topic from the advisor.
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 approval form](#) must identify both the research advisor 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 advisor.

5. The thesis committee endorse the proposal and forward it to the academic advisor 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 advisor. 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 advisor 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 will complete a new thesis approval form and obtain necessary signatures to be enrolled in 525.804 and continue the research.

## 5. Thesis Submission process

1. 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 advisor should also be informed about the defense. The final thesis must take account of relevant comments or questions that arise during the defense. Upon approval by the committee, the final electronic thesis is submitted to the library. **Note: If the final electronic thesis has not been submitted to the MSE library (<https://www.library.jhu.edu/library-services/electronic-theses-dissertations/>) by the end of the second semester, the research advisor may assign an "I" [incomplete] grade until all conditions are met.**
2. Once the library has accepted the final electronic thesis document, the student will receive an email notification of acceptance. The student forwards this email to thesis committee with the final thesis document and defense presentation.

3. Once the thesis committee receives the acceptance email, the thesis advisor needs to submit a grade in SIS or grade change form if not completed in time (Doug has accepted email notifications for grade changes as well).
  
4. After receiving the final acceptance email from the student, a final message that certifies the satisfactory completion of thesis, the defense presentation, and the thesis is sent by the research advisor to the academic advisor and the Program Chair. The Program Chair gives the final approval, and the research advisor then assigns the final grade to the relevant course. The approval message from the Chair to the research advisor and the final thesis are placed in the student's academic file and to the MSE Library. If the research advisor 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 advisor is ready to assign a final letter grade.

## 6. 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
<b>Nicholas Beser</b>	Nick.Beser@jhuapl.edu	525.612 Computer Architecture; 525.712 Advanced 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
<b>Saeed Chaudhry</b>	Schaud25@jhu.edu	525.742 System-on-a-Chip FPGA Design Laboratory	DSP/AI Algorithms implementation on FPGAs	
<b>Daniel Chew</b>	dchew@jhu.edu	525.201 Circuits, Devices and Fields; 525.751 Software Radio for Wireless Communications; 525.752 Digital Receiver Synchronization Techniques	DSP, Software-Defined Radio, Cognitive Radio, FPGA, and Embedded systems	Prior class experience with student desirable, but not necessary
<b>Brian Choi</b>	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
<b>Arnab Das</b>	Arnab.das@jhuapl.edu	525.616 Communication Systems Engineering	Communications and Networks	Student is expected to have familiarity with

				communications and networking
<b>Cleon Davis</b>	Cleon.Davis@jhuapl.edu	625.201 General Applied Mathematics; 625.615 Introduction to Optimization; 625.690 Computational Complexity	Intelligent systems (neural networks, genetic algorithms, fuzzy logic)	
<b>George (Dan) Dockery</b>	Dan.dockery@jhuapl.edu	525.771 Propagation of Radio Waves in the Atmosphere	EM/RF Propagation and scattering, Radar systems	Students should have basic electromagnetics coursework completed satisfactorily
<b>Ashutosh Dutta</b>	Ashutosh.Dutta@jhuapl.edu	525.641 Computer and Data Communication Networks I; 525.678 Next Generation Mobile Networks and Security with 5G	Security, Virtualization, Mobility, SDN	Student is expected to have familiarity with communications, networking, and wireless
<b>Clint Edwards</b>	Clint.edwards@gmail.com	525.202 Signals & Systems; 525.627 Digital Signal Processing; 525.648 Introduction to Radar Systems	Optics, Remote Sensing, Remote Sensing Sensors, Digital Signal Processing	
<b>A. Roger Hammons Jr.</b>	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.
<b>Ramsey Hourani</b>	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
<b>Jeff Houser</b>	jghouser@gmail.com, (301) 394-0797	525.624 Analog Electronic Circuit Design; 525.654 Communications Circuits Laboratory; 525.732 Advanced Analog Electronic Circuits; 525.743 Embedded Systems Development Laboratory	Analog Circuit Design, Embedded Systems, Communications Engineering	
<b>Daniel Jablonski</b>	Dan.Jablonski@jhuapl.edu	525.645 Modern Navigation Systems; 525.778 Design for Reliability, Testability, and Quality Assurance;	Microwave systems and communications, including radio navigation, GPS, broadband	Student expected to have taken a course from the instructor prior to research

		525.783 Spread Spectrum Communications; 525.789 Digital Satellite Communications	wireless and cellular, satellite communications, and aircraft avionics systems	
<b>David Jansing</b>	David.jansing@jhupl.edu; David.jansing@jhu.edu	525.612 Embedded Systems; 525.670 Machine Learning for Signal Processing; 525.748 Synthetic Aperture Radar	Remote Sensing, particularly Applied Remote Sensing (Synthetic Aperture Radar [SAR], EO/IR, Hyperspectral [HSI])	Interested in students who are looking for projects in remote sensing and the extraction of actionable information from remotely sensed data, particularly in SAR and HSI
<b>Brian Jennison</b>	Bjennis1@jhu.edu	525.202 Signals & Systems; 525.627 Digital Signal Processing; 525.780 Multidimensional Digital Signal Processing	Signal Processing	Student expected to have taken a course from the instructor prior to research
<b>Chiman Kwan</b>	Chiman.kwan@jhuapl.edu	525.650 Introduction to EO/IR Systems	Image processing, control, fault diagnosis, remote sensing, machine/deep learning	My aim is help the MS student publish a conference paper in IEEE, OSA, or SPIE. I am a fellow of OSA and a fellow of SPIE, and have over 30 years of R&D experience.
<b>Jeff Lesho</b>	Jeffery.lesho@gmail.com	525.786 Human Robotics Interaction	Robotics or Systems engineering fields	
<b>Tim Miller</b>	Timothy.miller@jhuapl.edu	525.746 Image Engineering	Imaging, Optical Sensors, Image Processing Algorithms	
<b>Neil F. Palumbo</b>	Npalumb1@jhu.edu	525.609 Continuous Control Systems; 525.770 Intelligent Algorithms	Control and Estimation, Intelligent Systems	Prior class experience with student desirable, but not necessary.
<b>John Samsundar</b>	John.samsundar@jhuapl.edu	525.670 Machine Learning for Signal Processing; 525.745 Applied Kalman Filtering; 525.744 Passive Emitter Geolocation	Tracking/Geolocating via Sensor Fusion, Sensor Scheduling, Machine Learning	
<b>Haya Shajaiah</b>	Hshaja1@jh.edu	525.634 High Speed Digital Design	Wireless systems, Cognitive systems and spectrum sharing, Machine	Prior class experience with student desirable, but not necessary

			learning and optimization	
<b>Ray Sova</b>	Raymond.sova@jhuapl.edu	525.691 Fundamentals of Photonics; 525.796 Introduction to High-Speed Optoelectronics; 525.772 Fiber-Optic Communication Systems; 525.636 Optics & Photonics Lab	Optics and Photonics, fiber optic communications, biophotonics, RF photonics, free space optics, electro-optic systems, space-based optical instrumentation, etc.	I will work with the student to choose a research topic that is based on the current state-of-the-art research in a selected area of specialization. The research activities will include performing a literature search, finding a topic that is manageable within the time frame of the master thesis.
<b>Steve Weiss</b>	Sweiss7@jhu.edu	525.605 Intermediate Electromagnetics; 525.618 Antenna Systems; 525.738 Advanced Antenna Systems	Antenna Theory	A student should have at least taken Antenna Systems

## 7. ECE Leadership Team

### Program Chair

Cleon Davis, PhD

Cleon.Davis@jhuapl.edu

240-228-9399

### Program Manager

Ramsey Hourani, PhD

Ramsey.Hourani@jhuapl.edu

240-228-9154

### Program Coordinator

Brittany Quinn

Brittany.Quinn@jhuapl.edu

240-592-5763

## 8. 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