SCHOOL OF ENGINEERING & TECHNOLOGY

UNIVERSITY of WASHINGTON | TACOMA

Electrical and Computer Engineering (ECE)

GRADUATE HANDBOOK

All Master of Science in Electrical and Computer Engineering students are responsible for understanding the information and policies contained in this handbook. This includes information linked to websites and documents. Information found on the websites for the School of Engineering and Technology, the Graduate School, and UW Tacoma supersedes information found in this handbook. This handbook is subject to change; please refer to the website for the most recent version

http://www.tacoma.uw.edu/set/graduate-resources

Information and Policies for ECE Graduate Degree Students

School of Engineering and
Technology University of Washington
Tacoma Campus: Cherry Parkes, Suite
133 Mailing:
1900 Commerce Street
Box 358426
Tacoma, WA 98402-3100
Ph: (253) 692-5860 Fax: (253) 692-5862 Email:
uwtech@uw.edu tacoma.washington.edu/tech

Dean: Raj Katti, PhD
Graduate Program Chair: Debasis Dawn, PhD
Graduate Program Coordinator: Debasis Dawn, PhD
Graduate Program Advisor (GPA): Victoria Olive
Schedule Advising Appointment: https://go.oncehub.com/techuwtgrad
Faculty Directory: https://www.tacoma.uw.edu/set/facultyresearch

All graduate students are required to subscribe to the **UW TECH GRAD e-mail listserv**. This is very important, as we will post course information, deadlines, and other notices on a regular basis. You can subscribe online here: mailman1.u.washington.edu/mailman/listinfo/uwtechgrad.

In addition, please sign up with **UW Alert** to receive updates via text or email regarding emergency closures of campus:
https://www.washington.edu/safety/alert/

The **graduate program chair** oversees matters relating to the graduate curriculum and the courses, including the review process of proposals for capstone projects, theses, and course substitutions.

The **graduate program coordinator** provides advising of a substantive, academic nature. The graduate program coordinator also functions as the liaison to the Graduate School.

The **graduate program advisor** is responsible for helping students with the technical pieces of graduate student life, such as deadlines, forms, and formal procedures.

Master of Science students who choose to pursue a thesis or capstone project will work closely with a member of the graduate faculty to give direction and shape to the work leading up to the final product.

Table of Contents

1. Overview of the Master of Science in Electrical and Computer Engineering (MS ECE) Program..... 4
2. Important Dates..... 4
3. MS ECE Curriculum.....5
4. MS ECE Thesis Requirements.....12
5. MS ECE Capstone Project Requirements.....13
6. Suggested MS ECE Areas of Study.....15
7. Prerequisite Requirement.....15
8. Course Days, Times, and Quarters Offered..... 17
9. Progression through the Program.....17
10. Course Substitutions, Independent Study Courses, and Research Seminar Courses.....17
11. Tuition-Exempt Status..... 18
12. Filing for Graduation – Request a Master's Degree..... 18
13. Funding Opportunities..... 18
14. International Students.....19
15. Index of Graduate School Memoranda..... 19
16. Campus Support.....23

1. Overview of the Master of Science in Electrical and Computer Engineering (MS ECE) Program

The objective of the Master of Science degree in Electrical and Computer Engineering (MSECE) at the University of Washington Tacoma is to provide students with a combination of advanced knowledge, hands–on experience, and applications of theory to support and further to improve their employment options in the field of Electrical and Computer Engineering (ECE). The curriculum is built upon the Bachelor's degree in Computer Engineering and Systems (CES), as well as the Bachelor's degree in Electrical Engineering (EE) at UW Tacoma. It emphasizes electrical and computer engineering industry-sought cutting-edge knowledge and critical skills. The curriculum includes courses in advanced computer architecture, advanced digital systems, advanced embedded control systems and signal processing, RF microelectronics, wireless communication, power systems, as well as cryptography and implementation of cryptographic systems. Graduates of this program will be qualified as experts and leaders in most of the electrical and computer engineering fields such as processor design, wireless communication, power systems and security, just to name a few.

VISION

The School of Engineering and Technology is a unique public/private partnership in higher education that serves as a catalyst for generating energy and interest in electrical and computer engineering disciplines by:

- Addressing the need to ensure the availability of well-educated bachelor's, master's in electrical and computer engineering professionals in numbers sufficient to support and fuel the growth of Washington's high-tech industries.
- Providing every Washington citizen access and opportunity to prepare for – and advance in – outstanding and rewarding technology careers.

MISSION

The School of Engineering and Technology:

- Provides high quality education by engaging students in discovery, application, and integration of knowledge focusing on electrical and computer engineering disciplines.
- Serves as a center of excellence for the electrical and computer engineering disciplines primarily for the local and state communities.
- Proactively supports a diverse population of current and future students with emphasis on non-traditional and underrepresented students.
- Enhances the vitality and prosperity of our local and state community.

2. Important Dates

Please be aware of all important dates, including registration dates at:
https://www.tacoma.uw.edu/registrar/registration

Graduate School deadlines at:
https://grad.uw.edu/for-students-and-post-docs/dates-and-deadlines/

3. MS ECE Curriculum

The MS degree in ECE program will have two options: the coursework only option and the Thesis option. The coursework option is meant for students who want to seek employment in industry while the thesis option, which involves more in-depth research, is designed for students who may consider pursuing a Ph.D, though at this stage the MS ECE does not have a pathway to Ph.D.
In line with UW master level requirements, the degree requirements for the MS ECE program are the following.

- A minimum of 45 credits are required for the MS ECE degree.
- A minimum grade of 2.7 is required in each course counted toward the degree.
- A minimum GPA of 3.00 is required for graduation.
- Students must be registered for at least 2 credits in the quarter the degree is earned.
- Students must complete all degree requirements within six years.

The following are the degree requirements for each option in the MSECE program.

- **Thesis Option** (***a minimum of 45 credits is required***)
  1) (Required credits): a minimum of 15 credits from the elective course list below, and a minimum of 15 credits from the core course list below
  2) (Optional) Non ECE, EE, CES (not listed under core/elective): 5 credits maximum, 4xy or above
  3) (Required credits) TECE 700 (thesis): a minimum of 9 credits required, max 15 credits
- **Coursework-only Option** (***a minimum of 45 credits is required***)
  1) (Required credits): a minimum of 20 credits from the elective course list below, and a minimum of 15 credits from the core course list below
  2) (Optional) Non ECE, EE, CES (not listed under core/elective): 5 credits maximum, 4xy or above
  3) (Required credits) TECE 5xy Capstone: 5 credits

Both options require 45 credits to graduate. Within each option, bullets 1 and 3 refer to required credits. The second bullet refers to optional coursework that students may take from other areas (excluding electrical or computer engineering) such as computer science, business or mathematics. If students do not take the optional credits from another area, then they have to take additional credits from the required credit list in bullet 1. So, as an example, if a student selects the thesis option with 10 credits, then they have to take 35 credits from 500-level courses. A similar procedure is applied to the coursework-only option. That's why in the first bullet of the two options, only the minimum number of credits is specified; indeed, the actual number taken for each student may be larger to reach 45 total credits.

Core Courses: each course is worth 5 credits on a quarter system unless otherwise stated; the courses listed below are new and under development. Other courses will be developed in the future based on new faculty expertise added to the program.

TECE 510 Advanced Computer Architecture
TECE 512 Advanced Embedded Systems
TECE 521 Advanced VLSI Communication
TECE 531 Advanced Power System Operation
TECE 539 Advanced Power Electronics
TECE 551 Control Systems Design
TCSS 555 Machine Learning

TECE 563 Modern Signal Processing
TECE 565 Advanced Random Signal Processing

Elective Courses: each course is worth 5 credits on a quarter system unless otherwise stated; the courses listed below are new and under development. Courses listed below are grouped by emphasis areas in ECE. Other courses will be developed in the future based on new faculty expertise added to the program.

TECE 510 Advanced Computer Architecture
TECE 512 Advanced Embedded Systems
TECE 514 Distributed Systems
TECE 516 Graphics Processing Unit Architecture
TECE 521 Advanced VLSI Communication
TECE 523 Wireless IC design
TECE 531 Advanced Power System Operation
TECE 533 Renewable Energy Systems
TECE 535 Power Distribution Systems
TECE 537 Generalized Theory of Electrical Machines and Drives
TECE 539 Advanced Power Electronics
TECE 551 Control Systems Design
TECE 553 Digital Control Systems
TECE 555 Nonlinear Systems
TCSS 555 Machine Learning
TECE 557 Optimal and Robust Control
TECE 563 Modern Signal Processing
TECE 565 Advanced Random Signal Processing
TECE 567 Digital Communications
TECE 569 Wireless Communications
TCSS 569 Introduction to Cyber-Physical Systems
TCSS 571 Wireless and Mobile Networking
TECE 572 Microwave Engineering
TECE 573 Advanced Electromagnetics
TCSS 573 Internet of Things
TCSS 580 Information Theory
TCSS 581 Cryptography
TCSS 582 Cryptographic Protocols
TECE 590 Special Topics in ECE
TECE 598 Masters Seminar

Thesis/Capstone Course: requires a submitted Thesis/Capstone Registration Form prior to registration.

https://www.tacoma.uw.edu/sites/default/files/2024-01/set-grad-course-reg-form-update.pdf

TECE 599 Capstone in ECE
TECE 700 Master's Thesis

Independent Study or Research Course: requires a submitted Independent Study Registration Form prior to registration.

https://www.tacoma.uw.edu/sites/default/files/2024-01/set-grad-course-reg-form-update.pdf

TECE 600 Independent Study or Research

Internship Course: worth 1 – 10 quarter credits; optional; do not count towards degree requirements; requires a submitted Internship Registration Form prior to registration.

https://www.tacoma.uw.edu/sites/default/files/2024-01/graduate-internship-registration-form_udpated.pdf

TECE 701 Internship

Brief Course Descriptions

TECE 510 Advanced Computer Architecture
Focuses on the techniques of quantitative analysis and evaluation of modern out-of-order Superscalar computing systems. Emphasis is on major component subsystems of high-performance computers: pipelining, instruction level parallelism, prefetching, branch prediction, memory hierarchies, input/output, multithreading, and virtual memory. Students will undertake a project in Simplescalar/Gem5/Structural Simulator Toolkit.

TECE 512 Advanced Embedded Systems
Focuses on designing microprocessor-based embedded systems for real-time applications. Topics covered include specifying design constraints, scheduling, allocation, pipelined data paths, communication architecture, software task scheduling, memory architecture and utilization, and technical documentation.

TECE 514 Distributed Systems
Introduces the techniques for creating functional, usable, and scalable distributed systems. The students should gain knowledge on client and server design, communication issues and remote procedure call, coordination and synchronization, concurrency, consistency and replication, caching, fault tolerance and commit protocols.

TECE 516 Graphics Processing Unit Architecture
Focuses on designing graphics and accelerated processing unit that comprises of many cores to explore massive parallel computation. Topics covered include many core architectures to achieve massive parallelism in computation, its algorithms, scheduling mechanism, programming models and performance evaluation. Prerequisite: a minimum grade of 2.7 in TECE 510.

TECE 521 Advanced VLSI Communication
Provide a basic foundation and understanding of the analysis and design of Radio Frequency (RF) communication circuits and systems. The course contents will provide a systematic treatment of Very Large-Scale Integrated (VLSI) Radio Frequency electronics from microwave and communication theory leading to the design of RF transceivers and circuits.

TECE 523 Wireless IC design
Basic concepts of wireless integrated circuit (IC) design. Various radio transceiver architectures and their applications are presented. Design of CMOS radio transceiver circuit blocks including hands on

experience on IC design & layout using industry-based chip design software Cadence are addressed.

TECE 531 Advanced Power System Operation
Provides insights to engineers who plan and perform operation of electricity supply systems. Students will gain systematic understanding of electricity network operation under both steady-state and fault conditions. Students will also be exposed to advanced knowledge of modern electricity network operation.

TECE 533 Renewable Energy Systems
Introduces the fundamentals of renewable energy sources and provides details of their conversion into electricity. Students will gain detailed knowledge of the engineering challenges of renewable energy production and a wider understanding of renewable energy in a societal context.

TECE 535 Power Distribution Systems
Provides students with a well-balanced understanding of the essential principles of power distribution engineering including a basic understanding of network design, network architecture and network operation. It also provides extensive experience of recent changes in distribution system and industrial applications with the relevant theoretical background.

TECE 537 Generalized Theory of Electrical Machines and Drives
Investigates the generalized fundamentals of electromechanical energy conversion systems and rotating electrical machines based on the reference-frame theory. It uses the Park's equations-based model of Alternating Current (AC) machines to calculate transient and steady-state conditions. It employs MATLAB and PLECS for computer simulations and analysis of unbalanced operation.

TECE 539 Advanced Power Electronics
Explores the fundamental principles of dc applied to dc converters, inverters, rectifiers, soft-switching, and resonant converters. It covers the underlying control methods and the modulation techniques. The theoretical analysis of the power electronics circuits in this course is accompanied by computer simulation studies using PLECS and MATLAB/Simulink software packages.

TECE 551 Control Systems Design
Introduces multi-variable linear control systems. Topics include frequency analysis, loop shaping, structural analysis, phase plane analysis, the state transition matrix, Lyapunov stability, controllability gramian, observability gramian, full state feedback controller design, observer design, and Linear Quadratic Regulator (LQR) optimal control.

TECE 553 Digital Control Systems
Covers control system design in discrete-time using classical methods including the z-transform and state space difference equations. Topics include modeling sampled-data systems, frequency response of discrete time systems, aliasing, gain and phase margins, discrete-time stability, root locus, loop shaping, full state feedback, state estimation, and Nyquist stability criterion.

TECE 555 Nonlinear Systems
Focuses on the analysis of nonlinear systems and design of controllers. Topics include analysis of nonlinear dynamics, phase plane analysis, vector fields and flows, Lyapunov stability theory, uniform ultimate boundedness, input-output stability, input-to-state stability, limit cycles, Poincare maps, feedback linearization, and control of robotic systems.

TCSS 555 Machine Learning
Explores learning and predictive modeling methods for data analysis, such as decision trees, instance based earning, Bayesian learning, neural networks, ensemble methods, and support vector machines. Surveys fundamental concepts of learning theory.

TECE 557 Optimal and Robust Control
Covers calculus of variations for dynamical systems to establish the basic optimal control problem. Topics include Lagrange multipliers, the Pontryagin Maximum Principle, necessary conditions for optimality, the Hamilton-Jacobi-Bellman equation, dynamic programming, bang-bang control, balanced model realization and truncation, H2 optimal control, and H-infinity robust control.

TECE 563 Modern Signal Processing
Introduces advanced techniques for processing digital signals. Topics include oversampling for Analog-to-Digital conversion, efficient implementation of recursive and nonrecursive digital filters, design of digital filters in both recursive and nonrecursive forms, and Multirate signal processing.

TECE 565 Advanced Random Signal Processing
Introduces advanced random signal analysis for applications to statistical signal processing and digital communications. Topics include statistical analysis of random processes, stationary random processes, Wide-Sense Stationary (WSS) processes, Gaussian processes, linear transformation of random signals, spectral analysis, white noise and Additive White Gaussian Noise (AWGN) channel, matched filter, and detection.

TECE 567 Digital Communications
Provides foundations for the design, analysis and implementation of advanced digital communication links at the physical layer of the protocol stack. Topics include digital modulation schemes and performance evaluation, optimum receivers for Additive White Gaussian Noise (AWGN) channels, and introduction to channel coding via linear block and convolutional codes.

TECE 569 Wireless Communications
Provides the basic foundation of wireless propagation environment and wireless communication systems to design and analyze optimum receivers for various wireless communication in fading channels. Topics include diversity, multiple input multiple output (MIMO) system, spread spectrum modulation, orthogonal frequency division multiple access, and channel code design.

TCSS 569 Introduction to Cyber-physical Systems
Covers fundamentals of Cyber-Physical Systems (CPS). In addition to signals and systems, linear transforms and analysis, state machines and how to build models of hybrid systems, the course also introduces basics of embedded systems and the computation models of systems, including both software components and physical dynamics.

TCSS 571 Wireless and Mobile Networking
Covers fundamental concepts in emerging wireless and mobile networking technologies. Topics may include networking protocols, wireless and cellular networks and other wireless advanced topics such as vehicular wireless networks, sensing, wireless sensor networks, data fusion and integration, synchronization, routing and localization.

TECE 572 Microwave Engineering
Review of Maxwell equations, transmission lines and propagation of electromagnetic waves in

unbounded media. Other topics include waveguides and resonators, planar microwave structures, microwave devices and filters, microwave network analysis. Engineering applications will be addressed.

TECE 573 Advanced Electromagnetics
Covers propagation of electromagnetic waves in linear and non-linear materials, reflection and refraction of electromagnetic waves, waveguides and optical fibers, scalar theory of diffraction, radiation and antennas. Special topics on EM wave propagation are also addressed.

TCSS 573 Internet of Things
Examines physical design and logical design of Internet of Things, functional blocks and architecture, protocols and communication models, enabling technologies, application domains specific to Internet of Things, smart objects, development tools, system management, cloud services, security and data analytics.

TCSS 580 Information Theory
Examines entropy and other measures of information; data compression fundamentals and modern algorithms; reliable data transmission; and the channel capacity theorem for discrete memoryless and Gaussian channels. Applications to games of chance, perfect secrecy, and error correction are briefly covered.

TCSS 581 Cryptography
Covers simple ciphers, block and stream ciphers, attacks, public-key ciphers, electronic signature, cryptographic algorithms, and real-world examples.

TCSS 582 Cryptographic Protocols
Covers advanced topics of cryptographic protocols, including formal definitions of security, composability, zero knowledge proofs, commitment schemes, oblivious transfer, secure two-party computations and secure multi-play computations.

TECE 590 Special Topics in ECE
Examines current topics and issues associated with Computer and Electrical Engineering.

TECE 598 Masters Seminar
This weekly seminar is offered for graduate students of the Master of Science in Electrical and Computer Engineering program. Each week the instructor will select a relevant topic of current research or emerging technology.

TECE 599 Capstone
Provides the opportunity to demonstrate comprehensive knowledge in Electrical and Computer Engineering. Students work under the supervision of a graduate faculty advisor to design and implement an original project. The specific project must be discussed with, proposed to, and accepted by a faculty advisor. Submitted Capstone Registration Form required prior to registration:

https://www.tacoma.uw.edu/sites/default/files/2024-01/set-grad-course-reg-form-update.pdf

TECE 600 Independent Study or Research
Provides an opportunity for students to study advanced topics or conduct research outside of class under the supervision of a graduate faculty advisor. The specific topic must be agreed upon by the

student and faculty advisor. Submitted Independent Study Registration Form required prior to registration:

https://www.tacoma.uw.edu/sites/default/files/2024-01/set-grad-course-reg-form-update.pdf

TECE 700 Master's Thesis
Provides an opportunity to demonstrate comprehensive knowledge in an area within Electrical and Computer Engineering. The student completes a research project under the supervision of an engineering graduate faculty advisor. Prerequisite: permission of instructor. Submitted Thesis Registration Form required prior to registration:

https://www.tacoma.uw.edu/sites/default/files/2024-01/set-grad-course-reg-form-update.pdf

TECE 701 Internship
This course provides an opportunity for students to pursue a significant project or practical application in an engineering service, industrial, or research setting under the supervision of a graduate faculty advisor and internship sponsor. Submitted Internship Registration Form required prior to registration:

https://www.tacoma.uw.edu/sites/default/files/2024-01/graduate-internship-registration-form_udpated.pdf

4. MS ECE Thesis Requirements

A. MS ECE degree with "thesis option" is research oriented and the student is expected to make original contributions to the field of study. This final thesis often includes:

- A problem statement (the objective or hypothesis of the thesis).
- An explanation of the current state-of-the-art relevant to this problem.
- Presentation of the new knowledge created by the student in meeting this objective or testing this hypothesis.
- MS ECE thesis work must be of significant quality and novelty to warrant publication in an appropriate peer-reviewed conference or journal. Hence, an MS ECE thesis student must work closely with both their major advisor and supervisory committee as they progress on their research. Significant guidance from the student's major advisor and supervisory committee is expected since this is often a student's first exposure to the research process.

B. Preliminary Research Proposal

MS ECE students who are planning to register for TECE 700 for research credit must select a major advisor. With the consultation of the major advisor, they must select at least two additional supervisory committee members who can be faculty members within the school and with the similar area of research topics. One supervisory committee member can be selected from outside the school whose major aligns with research topics. After spending at least one quarter with TECE 700 for research credits students after consultation with major advisor must prepare a preliminary research proposal with a concrete plan towards finishing their final thesis for approval from the supervisory committee. This preliminary research proposal should include (10 pages max excluding list of references):

- Proposed title of the research
- Objective of the student's work or the hypothesis he/she wishes to investigate
- Explanation of why this topic is significant
- Explanation of what others have done in the area
- Explanation of how the student proposes to attack this problem
- Preliminary supporting results
- Expected results and implications
- Proposed timeline for each of the project deliverables
- List of references

C. Final M.S. Thesis Defense

The candidate shall pass a final oral examination before being awarded the M.S. degree. The supervisory committee shall serve as the examining committee of which the major adviser shall serve as chair. The final examination shall cover the overall research work with the highlights of novel contribution. The thesis in a near final form must be given to the committee members no fewer than fourteen (14) days prior to the examination. If this fourteen (14) day stipulation cannot be met, the student must either secure the concurrence of all committee members or reschedule the examination. At the conclusion of the examination, the examining committee shall record, in writing, approval or required revisions and/or actions for improvements. In all cases, a simple majority vote is required.

Any members of the Supervisory Committee who do not agree with the majority opinion are encouraged to submit a minority report to the Dean of the Graduate School. The examining committee will provide signatures on the Master's Thesis Approval Form. Please see Section E. Continuous enrollment is required until all degree requirements are completed, including submitting final copies of the thesis. You have 6 years from the day you start to complete your M.S. degree. To participate in commencement, the student must have passed the final examination seven days prior to the commencement ceremony.

D. Publication Requirement

All MS ECE students are required to submit their work to at least one peer reviewed journal or conference prior to their final thesis defense. Acceptable journals/conferences are left up to the student's major advisor and supervisory committee.

E. Submission of Final Thesis

Students can defend their final thesis "at least spending one quarter" after the approval of preliminary research proposal. Students who are completing a Thesis (TECE 700) have additional requirements to adhere to specifically regarding the style and submission of documentation. The Thesis and Dissertation Style Manual is located online at:
http://www.grad.washington.edu/students/etd/
Thesis students will also need to submit their documentation to the Graduate School for preliminary review prior to final submission. Details and dates can be found online at:
https://grad.uw.edu/for-students-and-post-docs/thesisdissertation/

5. MS ECE Capstone Project Requirements

The goal of the capstone option is for students to complete a culminating project where they apply the knowledge acquired through their MS ECE degree. Capstone projects may involve planning, design, simulation, implementation, and testing of an original research idea or a novel engineering solution. The capstone project is supervised by a faculty advisor who must approve the project proposal. Students must take a total of 5 credits of TECE 599 which may be divided over one or more quarters. The following requirements must be met for students to receive credit for TECE 599 and complete the capstone graduate requirement.

1. Students must take a minimum of 20 credits of graduate coursework before registering for TECE 599.
2. Students must select a faculty advisor who agrees in writing to supervise their capstone project. Ideally, the faculty advisor is an expert in a field related to the focus area that the student has chosen.
3. With advice from the faculty advisor, the student will form a committee with 2-4 members (including the faculty advisor). At least half of the committee members must be members of the graduate faculty.
4. Before enrolling in TECE 599, the student must write a capstone project proposal and

submit it to the committee for approval. The committee may give feedback on the project plan, scope, or deliverables. The proposal should contain the following:

   a. Proposed title of the project.
   b. Specific research objective or novel engineering objective of the project.
   c. Explanation of why this objective is significant.
   d. Explanation of what others have previously accomplished towards this goal.
   e. Explanation of the proposed plan to solve problem.
   f. Preliminary supporting results or design steps.
   g. Expected results and implications.
   h. Proposed timeline for each of the project deliverables.
   i. List of references.

5. After the capstone committee approves of the project proposal, the student may enroll in TECE 599 and complete the project.
6. Students must document their progress on the project which will conclude with a final project report. The report should include relevant background material, a description of the proposed problem, a detailed explanation of original contributions or design innovations, any data collected, or results obtained during the project, a summary of potential impacts of the project, and a list of references. A complete draft of the final report must be submitted to the capstone committee at least 14 days prior to the final presentation.
7. Near the end of the project, the student can schedule a final examination with approval of the entire capstone committee. The final examination consists of a final presentation followed by questions from the committee. This presentation is open to other faculty and students who may ask questions. It is recommended to complete this presentation by the end of the 9th week of the quarter to allow for time to complete the project report; this requirement may be waived with permission of the capstone committee.
8. At the conclusion of the examination, the examining committee shall record, in writing, approval or required revisions and/or actions for improvements. In all cases, a simple majority vote is required. After the presentation, the committee members may give feedback to the student on the presentation or report. The student will finalize the project and report and deliver to their graduate advisor by the last day of final exams for that quarter.

6. Suggested MS ECE Areas of Study

Suggested areas of study with corresponding courses include:

- Computer Engineering
- Control Systems and Robotics
- Power and Energy Systems
- Signal Processing and Communications

Computer Engineering:
Core Courses: TECE510, TECE512, TECE514, TECE521
Elective Courses: TECE516, TECE523, TECE553, TCSS555, TECE563, TCSS569, TCSS573

Control Systems and Robotics:
Core Courses: TECE551, TECE553, TECE555, TECE557
Elective Courses: TCSS555, TECE563, TECE565, TCSS580

Power and Energy Systems:
Core Courses: TECE531, TECE533, TECE537, TECE539
Elective Courses: TECE535, TECE551, TCSS557

Signal Processing and Communications:
Core Courses: TECE521, TECE563, TECE565
Elective Courses: TECE523, TECE567, TECE569, TCSS571, TECE572, TECE573, TCSS580

7. Prerequisite Requirement

MS ECE students must meet prerequisite requirements before enrolling into any of the graduate level courses TECE5xx. Especially undergraduate students with non-ECE major degree may need to take an extra year or so to complete these prerequisite courses before getting enrolled into MS ECE graduate level courses.

Following are the lists of prerequisite courses or equivalent for enrolling into TECE5xx. In case prerequisites are not satisfied one can still enroll with instructor's permission.

TECE510:
[TCES430 (Microprocessor System Design), TCES372 (Computer Architecture)]

TECE512:
[TCES460 (Embedded System Design]

TECE516:
[a minimum grade of 2.7 in TECE510]

TECE521:
[TCES215 (Electrical Circuits I), TEE315 (Electrical Circuits II), TCES312 (Electronics I), TEE316 (Electronics II), TCES421 (Digital Integrated Circuits or VLSI)]

TECE523:
[TCES215 (Electrical Circuits I), TEE315 (Electrical Circuits II), TCES312 (Electronics I), TEE316 (Electronics II), TCES421 (Digital Integrated Circuits or VLSI)]

TECE531:
[TEE315 (Electrical Circuits II), TEE431 (Power Systems)]

TECE533:
[TEE315 (Electrical Circuits II), TEE431 (Power Systems)]

TECE535:
[TEE431 (Power Systems)]

TECE551:
[TCES310 (Signals and Systems), TEE451 (Control Systems)]

TECE553:
[TCES310 (Signals and Systems), TEE451 (Control Systems)]

TECE563:
[TCES310 (Signals and Systems), TEE453 (DSP)]

TECE565:
[TCES310 (Signals and Systems), TCES380 (Stochastic Signal Theory)]

TECE567:
[TCES310 (Signals and Systems), TCES380 (Stochastic Signal Theory), TEE341 (Communication Theory)]

TECE569:
[TCES310 (Signals and Systems), TCES380 (Stochastic Signal Theory), TEE341 (Communication Theory)]

Following are the lists of prerequisite courses or equivalent for enrolling into TCSS5xx. In case prerequisites are not satisfied one can still enroll with instructor's permission:

TCSS555:
[TCSS142, TCSS143, TCSS305, TCSS321, TCSS342, TCSS343]

TCSS571:
[TCSS343, TCSS360, TCSS422]

TCSS573:
[TCSS343, TCSS360, TCSS422]

TCSS581:
[TMATH300 or TMATH308, TCSS321, TCSS487]

TCSS582:
[TMATH300 or TMATH308, TCSS321, TCSS487]

8. Course Days, Times, and Quarters Offered

The UW Time Schedule lists credit classes offered at the University of Washington - Tacoma. It is updated daily and is subject to change. Please contact your Graduate Advisor, Victoria (olivev@uw.edu) with questions.
https://www.tacoma.uw.edu/registrar/registration#permalink-15721

9. Progression through the Program

Students must adhere to the following policies**:**

- A student is recommended to enroll in no more than 13 credits per quarter for 500-700 level courses.
- Prerequisites must be completed prior to taking elective courses.
- Core courses may be taken with elective courses, as long as the prerequisites are met.
- All prerequisite and core courses must be successfully completed prior to enrolling in a capstone course.

Any deviation from the policies listed above must be approved by the Graduate Committee.

10. Course Substitutions, Independent Study Courses, and Research Seminar Courses

At times it may be in the student's best educational interest to take courses outside the Electrical and Computer Engineering graduate program. A student may petition the Graduate Committee to be allowed to use one of the following course substitutions:

- take an equivalent prerequisite course at another institution
- take a graduate level elective in electrical and computer engineering department at another institution
- take a relevant, graduate level, elective course from another program or department, either at UWT or elsewhere.

The following policies apply to course substitutions:

- a maximum of five (5) credits from out-of-program courses, independent study courses, or research seminar courses will be counted toward the credits required for a degree

Students have the option of taking an elective at the UW Seattle or UW Bothell campuses. Courses in Seattle fill quickly and it is the student's responsibility to contact the Graduate Advisor for Electrical and Computer Engineering Department in Seattle to inquire about space and permission to enroll once the Graduate Committee has approved the course.
https://www.ece.uw.edu/academics/grad/

The form to request the substitution of a course is available on the graduate resources webpage: http://www.tacoma.uw.edu/set/graduate-resources. Capstone courses cannot be waived or substituted.

11. Tuition-Exempt Status

Eligible University and State of Washington employees may enroll in up to twelve credits towards the requirements of any graduate degree program using a tuition exemption, provided they enroll on a space-available basis. Eligible students are allowed to enroll in courses that have been designated as available for tuition exemption. The following courses are eligible for tuition exemption: TECE510, TECE512, TECE521, TECE531, TECE539, TECE551, TCSS555, TECE563 and TECE565. A maximum of 6 credits per quarter will be eligible for tuition exemption. Tuition-exempt students may register beginning the third day of the quarter (UW staff and faculty) or the fourth day of the quarter (all others). More information about tuition exemption policies can be found online: https://www.tacoma.uw.edu/uwt/registrar/tuition-exemption

Students enrolled in courses other than TECE510, TECE512, TECE521, TECE531, TECE539, TECE551, TCSS555, TECE563 and TECE565 are not eligible for tuition exempt status and must pay tuition and fees.

12. Filing for Graduation – Request a Master's Degree

Students will apply for graduation online at:

https://www.tacoma.uw.edu/registrar/graduation-procedures#permalink-4971

Below is a timeline in which students may submit their Master's Degree Request. If students miss the deadline to file their request, they must register for credits in the following quarter. Please check the Graduate School's timeline often during your last quarter:

http://grad.uw.edu/for-students-and-post-docs/dates-and-deadlines/

Although students may complete the program in any quarter, the annual graduation and hooding ceremonies only occur once a year. Participation requires online or in-person registration. Please watch your email during your final quarter and contact the graduate advisor for information. Students completing in summer may participate in ceremonies in the spring prior to completing.

13. Funding Opportunities

The School of Engineering and Technology awards one to two scholarships to MSECE students each year, as well as research assistantship positions. The William H. Phillip fellowship is awarded each fall and is awarded to residents of Pierce County pursuing their MSECE degree at UW Tacoma.

The number of research assistantships and other paid research positions vary depending on grants awarded to the school. Students on H-4 visas may not be eligible for these positions or any other paid position. Positions will be advertised on the website and on uwtechgrad@uw.edu. Students must submit a separate application to be considered.

Students seeking funding should utilize the resources provided by the Graduate Funding Information Service at http://www.lib.washington.edu/commons/services/gfis and the UW Tacoma Office of Global Affairs at:
https://www.tacoma.uw.edu/oga/sf
Both these resources offer opportunities to schedule an appointment with a representative.

14. International Students

Students on F-1 visas will pay non-resident tuition. F-1 students are eligible to apply for research assistantship positions and may work on campus for up to 20 hours per week. Students on H-4 visas can qualify for in-state tuition if they have lived in Washington for 12 consecutive months. H- 4 students may not be eligible for any paid positions but may convert to an F-1 visa after three full- time quarters.

Students must contact the Residency Office in Seattle for residency petitions and all related information. Please visit the website for more information: https://registrar.washington.edu/students/residency/

Students should contact the International Student Services office for advising prior to making any visa changes. In addition, the ISS coordinates the CPT and OPT approval process. Students should contact ISS first, then follow up with the graduate advisor. Please note that new students are not eligible for CPT.

15. Index of Graduate School Memoranda

The Index of Graduate School Memoranda includes graduate program policies maintained by the Graduate School. Content is reviewed and modified as needed. Final decisions regarding implementation or continuation of policies receive the advice of the Graduate School Council.
Below are a few memorandums that the School of Engineering and Technology would like to make sure you are aware. All of the memoranda are available online at:
https://grad.uw.edu/policies-procedures/graduate-school-memoranda/

Continuous Enrollment and On Leave Status

Graduate students are required to maintain graduate status during their program of study. Failure to maintain this status requires reinstatement to the University of Washington. Students who desire to take a quarter or quarters off without going through the reinstatement process must apply for on-leave status for each quarter they do not register. For complete details regarding the on-leave policy, refer to Memo 9.

On-leave Eligibility

- Must be a graduate student in good standing.
- Must have been registered or on-leave the previous quarter.
- Must satisfy any graduate program policies pertaining to going/remaining on-leave.
- US citizen and permanent residents must have registered for at least one quarter of graduate study at UW and have approval from their graduate program.
- International students must have registered full time (10 or more credits) for three consecutive quarters and have approval from both their graduate program and the International Student Services office.
- You may not go on leave after registering for capstone course credits.
- Pre-registered students must officially withdraw via MyUW or the Registration office prior to the first day of the quarter. Registered students are not eligible for on-leave status.

Students on-leave **are** entitled to:

- return as a graduate student to the graduate program
- use University libraries
- maintain access to the UW email account
- use Hall Health Primary Care Center on a pay-for-service basis
- use the IMA with additional fee

Students on-leave are **not** entitled to:

- faculty and staff counsel/resources (very limited counsel/resources are permitted)
- examinations of any type (except for language competency)
- thesis/dissertation filing
- University housing
- student insurance
- financial assistance

Procedure for Requesting Leave

Beginning September 28, 2011, students requesting on-leave status must submit an online Request for On-Leave Status via MyGrad Program. For a given quarter, students can submit the request as early as two weeks prior to the first day of instruction and must submit payment of the non- refundable fee no later than 11:59:59 p.m. PST on the last day of instruction. Leave is granted on a quarterly basis, though the following students may request up to four consecutive quarters of leave at one time: PCMI students, military personnel with deployment orders, and some UW Fulbright grantees (with the exception of military personnel with deployment orders, these students will be required to pay the fee for each quarter of leave requested).

Reinstatement to the Graduate School

Students previously registered in the Graduate School who have failed to maintain graduate student status (on-leave status was not secured and registration was not maintained) but wish to resume studies within the same degree program must file a request for reinstatement to the Graduate School. Requests will first be reviewed and approved by the department. Once the department has approved the request and the Graduate School has confirmed students' eligibility for reinstatement, students will be notified to pay a non-refundable reinstatement fee before registering for the requested quarter of reinstatement.

Time to Degree and Limits for On-Leave Status

The Graduate School normally allows six years from the quarter of admission to complete requirements for a master's degree. **Periods spent On-Leave or out of status are included in these limits**. Before approving a *Petition for On-Leave Status* for a student whose leave period will take them in excess of these limits, the department must first file a *Petition to the Dean of the Graduate School* (via MyGrad Program) explaining why this action is being requested. This *Petition to the Dean* must be approved by the Graduate School before the *Petition for On-Leave Status* is filed.

Grading system

Grades shall be entered as numbers, the possible values being 4.0, 3.9, . . . and decreasing by one-tenth until 1.7 is reached. Grades below 1.7 will be recorded as 0.0 by the Registrar and no credit is

earned. A minimum of 2.7 is required in **each course** that is to be counted toward a graduate degree. A minimum cumulative grade-point average of 3.0 is required for graduation. See Memo 19 for more information.

Incomplete Grades

An Incomplete may be given only when the student has been in attendance and has done satisfactory work to within two weeks of the end of the quarter and has furnished proof satisfactory to the instructor that the work cannot be completed because of illness or other circumstances beyond the student's control.

To obtain credit for the course, a student must successfully complete the work and the instructor must submit a grade. In no case may an Incomplete be converted into a passing grade after a lapse of two years or more. An incomplete received by the graduate student does not automatically convert to a grade of 0.0 but the "I" will remain as a permanent part of the student's record.

Academic Probation

Students in the Master's program are graduate students at the University of Washington, and as such must abide by general graduate-school regulations regarding progress through the program. Grades earned in prerequisite courses are considered when evaluating low scholarship status.
Students should be aware of the following regulations detailed in Memo 16.

1. A minimum grade of 2.7 is required for a course to be counted toward the graduate degree.
2. A cumulative GPA of 3.0 is required for graduation.

The Graduate Program Coordinator and the CSS graduate faculty are expected to review the status of each student who violates the above polices and to transmit to the Dean of the Graduate School a specific recommendation: ***no action***, ***warn***, ***probation***, ***final probation***, or ***drop.***

No Action
May be recommended for those students whose cumulative GPA is above 3.0 but whose most recent quarter's work is below 3.0, if the review has determined that this condition is not cause for immediate concern.

Warn
May be recommended for those students whose cumulative GPA has dropped slightly below 3.0--i.e. 2.99-2.95.

May be recommended for those students who have failed to meet expectations for performance and progress as determined by the graduate program.

ACTION TAKEN AS INDICATED ABOVE WILL BE INITIATED BY THE GRADUATE PROGRAM, AND REPORTED TO THE GRADUATE SCHOOL, BUT WILL NOT APPEAR ON THE STUDENT'S PERMANENT RECORD.

Probation
May be recommended for those students who have not corrected the deficiency which caused the warn

action within the time limit specified by the graduate program.

May be recommended for those students who depart suddenly and substantially from scholarly achievement as defined by the graduate program. (A previous warn recommendation is not necessary).

Programs may determine the length of probationary status. (The Graduate School recommends no less than one quarter and no more than three quarters of probationary status). Students should be informed of the current program policy regarding the length of the probationary period.

Final Probation
May be recommended for those students who have not corrected the condition(s) that caused the probation recommendation within the time limit specified by the graduate program.

May be recommended for those students who fail to progress toward completion of the graduate program. A student will be carried on final probation status for one quarter before being changed to drop, probation, or some other status.

Drop
Final action to be recommended. A drop recommendation means immediate drop from the University of Washington. Therefore, this recommendation must be received in the Graduate School soon after the beginning of the quarter following the quarter on which the decision is based.

Recommendations for action on low grade point average or unsatisfactory performance and progress will be reviewed by the Dean of the Graduate School, and students will be informed of a change in status by letter from the Dean.

Appeals
Students may appeal change of status, as explained above, directly to the Chairperson of the graduate degree granting unit. Appeals beyond this point should follow the process outlined in Memo 33, Academic Grievance Procedure:
https://grad.uw.edu/policies-procedures/graduate-school-memoranda/

Repeating a Course

Graduate students may repeat any course. Both the first and second grades will be included in the cumulative GPA. Subsequent grades will not be calculated but will appear on the permanent record. The number of credits earned in the course will apply toward degree requirements only once.

16. Campus Support

There are several campus resources that you can use to get additional help, either for counseling or for specific kinds of help (for example, reading, writing, math, study skills, etc.). Contact them for further information.

Teaching and Learning Center (TLC): The Teaching and Learning Center (TLC) is a place where all members of the UW Tacoma community (students, staff, and faculty) can come for feedback, help, and inspiration during their academic and learning careers. The TLC provides instructional support in areas such as reading, writing, math, science, statistics, public speaking, and others.

Student Counseling Center (SCC): The Student Counseling Center is an on-campus resource that provides counseling to the students at UW Tacoma. It is common for students to experience times when they feel overwhelmed by the responsibilities of college, work, family, and relationships. The Student Counseling Center is here to help students cope with stresses and personal issues that can interfere with their ability to perform in school.

Disability Support Services (DSS): The University of Washington Tacoma is committed to making physical facilities and instructional programs more accessible to students with disabilities.
Disability Support Services (DSS) functions as the focal point for coordination of services for students with disabilities. In compliance with Title II or the Americans with Disabilities Act, any enrolled student at UW Tacoma who has an appropriately documented physical, emotional, or mental disability that substantially limits one or more major life activities [including walking, seeing, hearing, speaking, breathing, learning and working], is eligible for services from DSS.