

# **Master of Science in Engineering (MSE)**

## **Dr. Mateo Aboy**

### Program Overview

- ▶ Overview MSE (20 min)
  - Program Overview, Program Design
  - Admissions Requirements; 4+1;
  - MSE Programs & Sample Plan of Studies
  - Q&A (10 min)
  
- ▶ Overview of MSREE (20 min)
  - Program Overview, Program Design
  - Admissions Requirements; 4+1;
  - MSE Programs & Sample Plan of Studies
  - Q&A (10 min)
  
- ▶ TA/GAs (10 min)
  
- ▶ Optional General Q&A (30 min)

- ▶ **Degree:** MSE (in Selected Program Area)
- ▶ **Department:** EERE
- ▶ **Program Overview:**
  - Highly customizable and modular MS degree.
  - Enables to choose coursework from multiple disciplines to design specialties not available in the classical MS degrees.
  - The flexibility in the MS in Engineering degree ensures a relevant, up-to-date educational experience, and the ability to meet urgent industry needs in multidisciplinary technical fields.
  - The program is designed to provide maximum flexibility while maintaining academic rigor.

▶ Program Educational Objective:

- ▶ The MS in Engineering (MSE) at Oregon Tech is designed to prepare engineering professionals with advanced knowledge and skills in high-demand multidisciplinary fields who are ready to assume a broad range of technical and leadership roles.

▶ MSE Programs

- ▶ MSE - Systems Engineering
- ▶ MSE - Electrical Engineering
- ▶ MSE - Embedded Systems Engineering & Interconnected Devices
- ▶ MSE - Optical Engineering
- ▶ MSE - Automation, Robotics & Control Engineering
- ▶ MSE - Energy & Power Systems Engineering

▶ **Multidisciplinary/Interdisciplinary**

- MS in Engineering (Combines courses from multiple disciplines)
- MSE in Systems Engineering

▶ **Specialized**

- MSE in Embedded Systems Engineering & Interconnected Devices
- MSE in Optical Engineering
- MSE in Automation, Robotics, and Control
- MSE in Power Systems Engineering

▶ **Engineering Field**

- MSE in Electrical Engineering

- ▶ Master of Science in Engineering - Specialty Name  
(e.g., Master of Science in Engineering - Systems Engineering)
- ▶ Accepted Abbreviations  
(Example for Systems Engineering Specialty)
  - M.S. in Engineering - Systems Engineering
  - M.S. Engineering - Systems Engineering
  - M.S.E. Systems Engineering
- ▶ MSE Specialties appear in the transcript.

▶ Admission Requirements

- ▶ Meet Oregon Tech Graduate Admissions Requirements.
- ▶ BS degree in engineering, physical science, or related technical field (depending on specialty).
- ▶ Show evidence of 1) potential for graduate level academic work, 2) work experience or potential for success in industry, and 3) demonstrated interest in selected area of specialty. This evidence is to be provided as part of a Resume (required), Personal Statement, and/or 1-2 Reference Evaluations for Graduate Admission.

▶ Admission Application

- ▶ MSE Application Form; Official Transcripts;
  - ▶ Resume (3 pages maximum);
  - ▶ Optional: Personal Statement (2 pages maximum).
  - ▶ Optional: Reference Evaluations for Graduate Admission (2 maximum).
  - ▶ GRE scores: Considered in support of the application to show evidence of potential for graduate success, especially recommended for applicants without work experience or previous graduate level coursework (Optional).
  - ▶ TOEFL scores: required for applicants whose native language is not English.
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- ▶ 1) Verify Minimum GPA Requirement: 3.0 GPA
- ▶ 2) Complete Accelerated BS/MSE Application
- ▶ 3) Optional Attachments (particularly recommended for students whose BS engineering GPA is less than 3.50/4.00)
  - Resume
  - Faculty Reference Name (no written statement required)
- ▶ 4) Mail application to Prof. Mateo Aboy at [mateo.aboy@oit.edu](mailto:mateo.aboy@oit.edu) with a copy to your academic advisor. The email subject line needs to be “Accelerated BS/MSE Application.”



▶ Accelerated/Concurrent BSEE or BSREE & MSE

- Most efficient (5 yr program)
- 500-level courses satisfy the requirements of the BS & MSE
- The graduate project satisfies the degree requirements for the BSEE or BSREE & MSE
- BS & MSE degree concurrently awarded at the end of Year 5
- Enables students to serve as TAs in Year 4

▶ 4+1 BSEE or BSREE & MSE

- BS awarded in Year 4 & MSE in Year 5
- Requires two projects (Senior Project) & Graduate Project
- 500-level courses satisfy the requirements of the BS & MSE
- TAs available in Year 5

▶ Years 1-3

- ▶ Complete Freshman, Sophomore & Junior of the EERE BS program of study
- ▶ Apply for admission to the BS/MSE Concurrent Program in Spring/Summer Term

▶ Year 4

- ▶ Replace EE430 (DSP) & EE401 (Communications) for EE530 & EE501 [10 cr]
- ▶ Replace 3 Engineering Electives with 500-level MSE courses from EE, REE, or ENGR [9-12 credits]
- ▶ Complete Research Methods & Innovation Sequence (ENGR511, ENGR512, ENGR513 [9 cr] instead of Capstone Project

▶ Year 5 (BSEE & MSE jointly awarded)

- ▶ Replace 3 terms of ENGR465 Capstone Project with 3 terms of EE597, ENGR597 or REE599 Graduate Design Project [9-12 cr]
- ▶ Complete remaining Graduate Level courses [12 cr minimum]

# Oregon **TECH** Accelerated BSREE/MSE (5 yr)

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## ▶ Years 1-3

- ▶ Complete Freshman, Sophomore & Junior of the EERE BS program of study
- ▶ Apply for admission to the BS/MSE Concurrent Program in Spring/Summer Term

## ▶ Year 4

- ▶ Replace 3 Engineering Electives with 500-level MSE courses from EE, REE, or ENGR [9-12 credits]
- ▶ Complete Research Methods & Innovation Sequence (ENGR511, ENGR512, ENGR513 [9 cr] instead of Capstone Project

## ▶ Year 5 (BSREE & MSE jointly awarded)

- ▶ Replace 3 terms of ENGR465 Capstone Project with 3 terms of EE597, ENGR597 or REE599 Graduate Design Project [9-12 cr]
- ▶ Complete remaining Graduate Level courses [12 cr minimum]

▶ Years 1-3

- ▶ Complete Freshman, Sophomore & Junior of the EERE BS program of study
- ▶ Apply for admission to the BS/MSE Concurrent Program in Spring/Summer Term

▶ Year 4 (Graduate with BSEE or BSREE)

- ▶ Replace 3 Engineering Electives with 500-level MSE courses from EE, REE, SEM or ENGR [9-12 credits]
- ▶ Complete Research Methods & Innovation Sequence (ENGR511, ENGR512, ENGR513 [9 cr] instead of Capstone Project
- ▶ Complete the Senior Project courses [9 cr minimum]

▶ Year 5 (Graduate with a MSE)

- ▶ Replace 3 terms of ENGR465 Capstone Project with 3 terms of EE597, ENGR597 or REE599 Graduate Design Project [9-12 cr]
- ▶ Complete remaining Graduate Level courses [15 cr minimum]

- ▶ **Minimum Credit Requirement:** 45 credits  
(12-15 graduate courses; quarter system)
- ▶ **Specialization Credit Requirement:** 15 or more (of the 45 credits)  
(4 to 6 specialization courses)
- ▶ **Residency Requirement:** 30 or more credits at OIT (on campus or online)
- ▶ **Credits from Other Universities:** up to 15 credits may be transferred
- ▶ **Completion of Approved Plan of Study:**
  - Defined Specialty (Specified Plan of Study)
  - Custom Specialty with Advisory Committee Approval (Advisor(s), Program Director, Department Chair)

- ▶ Program Director: Prof. Dr. Mateo Aboy
- ▶ Specialty Directors:
  - Multidisciplinary MSE: Prof. Dr. Mateo Aboy
  - Electrical Engineering: Prof. Dr. Mateo Aboy
  - Systems Engineering: Prof. James Eastham
  - Embedded Systems Engineering & IoT: Prof. Allan Douglas
  - Optical Engineering: Prof. Dr. Scott Prahl
  - Robotics, Automation & Control: Prof. Dr. Robert Melendy

- Systems Engineering: James Eastham [Online, Portland-Metro]
- Electrical Engineering: Mateo Aboy [On-Campus, Portland-Metro]
- Embedded Systems & IoT: Allan Douglas [On-Campus, Portland-Metro]
- Optical Engineering: Scott Prahl [On-Campus, Portland-Metro]
- Automation, Robotics & Control [On-Campus, Portland-Metro]
- Energy & Power Systems Engineering [On-Campus, Portland-Metro]

## ▶ Multidisciplinary/Interdisciplinary

- MS in Engineering (Combines courses from multiple disciplines)
- MSE in Systems Engineering

## ▶ Specialized

- MSE in Embedded Systems Engineering & Interconnected Devices
- MSE in Optical Engineering
- MSE in Automation, Robotics, and Control
- MSE in Energy & Power Systems Engineering

## ▶ Engineering Field

- MSE in Electrical Engineering



## ▶ MSE (Multidisciplinary)

- Degree Designation: MS in Engineering
- Enables students to choose and combine coursework from multiple disciplines (e.g., electrical, robotics, systems, mechanical)
- Admission requires a BS degree in a engineering discipline or a hard sciences degree (e.g. Physics)

## ▶ MSE in Systems Engineering

- Degree Designation: MSE in Systems Engineering
  - Multidisciplinary MS program focused on systems engineering and engineering management
  - Admission requires a BS degree in a engineering or technical discipline or a hard sciences degree (e.g. Physics)
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## ▶ Multidisciplinary MSE Sample Plans of Study

- The following plans of study are shown for illustrative purposes only.
- They exemplify how MSE courses can be combined to develop focus areas in order to specialize in one or more fields of engineering.
- The specific MSE plan of study for a particular study is determined upon admission to the MSE program with the academic advise of the MSE Program Director and MSE Speciality Director. The specific plan of study takes into consideration the student background and career goes in order to selected the appropriate courses.

- ▶ MSE - System Engineering (Specialty Director: J. Eastham)
    - ▶ SEM521 Systems Engineering
    - ▶ SEM522 Advanced Systems Engineering
    - ▶ SEM525 Advanced Engineering Management
    - ▶ SEM526 Case Studies in Systems Engineering
    - ▶ Engineering, Systems Engineering or Technology Management Electives
    - ▶ ENGR511 Research Methods & Innovation: Intellectual Property
    - ▶ ENGR512 Research Methods & Innovation: Peer-Reviewed Research
    - ▶ ENGR513 Research Methods & Innovation: Innovation
    - ▶ Project/Publication/Thesis/Graduate R&D focused on Systems Engineering
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## ▶ Multidisciplinary/Interdisciplinary

- MS in Engineering (Combines courses from multiple disciplines)
- MSE in Systems Engineering

## ▶ Specialized

- MSE in Embedded Systems Engineering & Interconnected Devices
- MSE in Optical Engineering
- MSE in Automation, Robotics, and Control
- MSE in Energy & Power Systems Engineering

## ▶ Engineering Field

- MSE in Electrical Engineering

▶ **MSE in Embedded Systems Engineering**

- Specialized MSE program focused on embedded systems engineering and interconnected devices
- Admission requires a BS degree in electrical engineering, computer engineering, software engineering or CS (with strong EE fundamentals)

▶ **MSE in Optical Engineering**

- Specialized MSE program focused on optical engineering
- Admission requires a BS degree in electrical engineering or physics

**▶ MSE in Automation, Robotics, and Control**

- Specialized MSE program focused on automation, robotics and control
- Admission requires a BS degree in a engineering (e.g., electrical, mechanical, energy engineering) or physics

**▶ MSE in Power Systems Engineering**

- Specialized MSE program focused on energy and power systems engineering
  - Admission requires an ABET accredited degree in Electrical Engineering (BSEE) or Renewable Energy Engineering (BSREE) or engineering science with a strong foundation electrical and mechanical engineering
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## ▶ Specialized MSE Sample Plans of Study

- The following plans of study are shown for illustrative purposes only.
- The specific MSE plan of study for a particular study is determined upon admission to the MSE program with the academic advise of the MSE Program Director and MSE Speciality Director.
- The specific plan of study takes into consideration the student background and career goals in order to select the appropriate courses.

- ▶ MSE - Embedded Systems Engineering & IoT (Specialty Director: A. Douglas)
  - ▶ EE535 Embedded Systems Engineering I
  - ▶ EE555 Embedded Systems Engineering II
  - ▶ EE565 Sensors & Instrumentation
  - ▶ SEM521 Systems Engineering
  - ▶ EE Approved Electives (3 electives): PCB Design, DSP, Communications, Wireless Communications, Micropower Systems, Advanced Digital Design & HDL
  - ▶ ENGR511 Research Methods & Innovation: Intellectual Property
  - ▶ ENGR512 Research Methods & Innovation: Peer-Reviewed Research
  - ▶ ENGR513 Research Methods & Innovation: Innovation
- ▶ Project/Publication/Thesis/Graduate R&D focused on Embedded Systems & IoT



- ▶ MSE - Optical Engineering - (Specialty Director: S. Prahl)
    - ▶ EE548 Geometric Optics
    - ▶ EE549 Optical Detection and Radiometry
    - ▶ EE550 Physical Optics
    - ▶ EE551 Lasers
    - ▶ EE552 Waveguides and Fiber Optics
    - ▶ EE553 Optical Metrology
    - ▶ EE, ENGR or SEM Electives (2-3 courses depending on credits)
    - ▶ ENGR511 Research Methods & Innovation: Intellectual Property
    - ▶ ENGR512 Research Methods & Innovation: Peer-Reviewed Research
    - ▶ ENGR513 Research Methods & Innovation: Innovation
    - ▶ Project/Publication/Thesis/Graduate R&D focused on Optical Engineering
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- ▶ MSE - Automation, Robotics & Control (Specialty Director: R. Melendy)
    - ▶ ENGR520 Engineering Modeling & Simulation of Dynamic Systems
    - ▶ ENGR521 Automation Systems
    - ▶ ENGR523 Motion Control in Mechanisms & Robotics
    - ▶ ENGR524 Advanced Control Engineering
    - ▶ EE530 Digital Signal Processing
    - ▶ SEM521 Systems Engineering
    - ▶ ENGR, EE, SEM Electives (1-3 courses depending on credits, eg. Process Control)
    - ▶ ENGR511 Research Methods & Innovation: Intellectual Property
    - ▶ ENGR512 Research Methods & Innovation: Peer-Reviewed Research
    - ▶ ENGR513 Research Methods & Innovation: Innovation
    - ▶ Project/Publication/Thesis/Graduate R&D focused on ARC Engineering
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# Oregon **TECH** MSE Program - Plans of Study

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## ▶ MSE - Power Systems Engineering

- ▶ REE529 Power Systems Analysis
- ▶ REE549 Power System Protection & Control
- ▶ REE569 Grid Integration of Renewables
- ▶ REE527 Wind Power Generators
- ▶ REE547 Electric Power Conversion
- ▶ REE567 Wind Energy Systems Integration
- ▶ Electives on Energy & Power Systems: EE & REE
- ▶ ENGR511 Research Methods & Innovation: Intellectual Property
- ▶ ENGR512 Research Methods & Innovation: Peer-Reviewed Research
- ▶ ENGR513 Research Methods & Innovation: Innovation
- ▶ Project/Thesis focused on Energy & Power Systems Engineering

▶ **Multidisciplinary/Interdisciplinary**

- MS in Engineering (Combines courses from multiple disciplines)
- MSE in Systems Engineering

▶ **Specialized**

- MSE in Embedded Systems Engineering & Interconnected Devices
- MSE in Optical Engineering
- MSE in Automation, Robotics, and Control
- MSE in Energy & Power Systems Engineering

▶ **Engineering Field**

- MSE in Electrical Engineering

**▶ Degree Designation & Similar Programs**

- MSE in Electrical Engineering (MSE in EE)
- Department: Electrical Engineering & Renewable Energy (EERE)
- Similar Programs: [U. Michigan MSE in EE](#), [John Hopkins MSE in EE](#)
- Similar to other universities we use the designation MSE EE instead of MS EE to emphasize that admission to the MSE in EE program requires an ABET accredited BSEE degree. See U. Michigan [MSE in EE vs MS in EE Admission](#)
- Admission: ABET Accredited Bachelor of Science in Electrical Engineering (BSEE)

**▶ MSE in EE vs Other MSE Programs**

- MSE in EE is more general than the specialized MSE programs (Embedded Systems Engineering & IoT, Optical Engineering, and/or Automation, Robotics & Control)
- Admission to the MSE in EE is restricted to applicants with an ABET accredited BSEE

- ▶ MSE - Electrical Engineering (Director: M. Aboy)
  - ▶ Electrical Engineering Approved Courses (24 cr)
    - ▶ Sample Courses: Embedded Systems Engineering, Advanced Digital Design with HDL, DSP, PCB Layout, Communications, Wireless Communications, Power Electronics, Power Systems Engineering, Robotics, Automation and Control, Semiconductor Devices, Computational Data Science, Machine Learning
  - ▶ ENGR511 Research Methods & Innovation I: Intellectual Property (4 cr)
  - ▶ ENGR512 Research Methods & Innovation II: Peer-Reviewed Research (4 cr)
  - ▶ ENGR513 Research Methods & Innovation III: Commercialization (4 cr)
  - ▶ Project/Publication/Thesis/Graduate R&D focused on Electrical Engineering (9 cr)

- ▶ Any questions?
  - ▶ Program
  - ▶ Specialties
  - ▶ Faculty
  - ▶ Resources