

Master of Engineering in Energy, Environmental and Chemical Engineering (EECE)

Washington University in St. Louis - McKelvey School of Engineering

<https://eece.wustl.edu/academics/graduate-programs/MS-in-Energy-Environmental-Chemical-Engineering.html>

List of Classes for Entering Class: Fall 2021

Curriculum Structure for Master of Engineering in EECE:

- 30 total credits (at least 18 credits from EECE, no more than two 400-level courses)
 - 15 credits from core courses (see menu of choices below)
 - 15 credits from elective courses
 - All relevant 400- or 500-level courses are acceptable with permission of advisor (complete listings at <http://courses.wustl.edu>)
 - Up to 6 elective credits can be from Independent Study courses (EECE 500)
 - Up to 2 elective credits can be from EECE Seminar course (EECE 509, 1 credit/semester)
- Optional certificate programs (see pg. 2-3) can help you choose your courses around a theme
- Courses from University College and Engineering Continuing Studies (“U” and “T” designations) will not count towards the degree unless explicitly listed below or if granted special authorization from an advisor.
- Up to six units of graduate coursework from other institutions may be counted as transfer credit upon approval by the advisor. The units may not have been used towards the completion of a bachelor’s degree.
- BS/MEng students are permitted to count 6 credits towards both degrees (400-level and up)

The list is dynamic and may change. Students may choose other classes with the permission of their academic advisor.

Core Courses (total of 5 required courses)

- 1) Technical Core (choose 2, 3 credit classes)
 - a) Transport Phenomena in Energy, Environmental and Chemical Engineering (E44 EECE 501, Fall)
 - b) Advanced Thermodynamics in EECE (E44 EECE 502, Fall)
 - c) Aerosol Science and Technology (E44 EECE 504, Fall)
 - d) Environmental Organic Chemistry (E44 EECE 531, Fall) OR Aquatic Chemistry (E44 EECE 505, Fall) *
 - e) Kinetics and Reaction Engineering Principles (E44 EECE 507, Spring)
 - f) Bioprocess Engineering I: Fundamentals & Applications (E44 EECE 506, Spring)

**only one of these courses may be counted towards the core course requirement*
- 2) Mathematics (choose 1, 3 credit class)
 - a) Mathematical Methods in Engineering (E44 EECE 503, Fall)
 - b) Mathematics of Modern Engineering I (E35 ESE 501, Fall)
 - c) Mathematics of Modern Engineering II (E35 ESE 502, Spring)
 - d) Statistical Computation (L24 Mathematics 475, Fall)
- 3) Project Management (choose 1, 3 credit class)
 - a) Engineering Project Management (E44 EECE 597, Summer)
 - b) Project Planning Methodologies (T54 PRJM 523, Fall, Spring)
 - c) Engineering Management & Financial Intelligence (T55 ETEM 504, Fall, Spring)
- 4) Social, Legal, and Policy Aspects (choose 1, 3 credit class)
 - a) Environmental Policy (L11 Econ 451, Fall)
 - b) Sustainability Exchange: Community & University Practicums (E44 EECE 412, Fall, Spring, **limited seats available, priority given to undergraduate students**)
 - c) Interdisciplinary Environmental Clinic (L82 EnSt 539, Fall, Spring – *Note: You must apply to be in this class. See online course description for details.*)
 - d) Health Economics and Policy (B64 MEC 564, Fall)
 - e) Designing Sustainable Social Policies and Programs: A Systems Dynamics Approach (S65 SWCD 5660, Fall, Spring)
 - f) Foundations of Public Health: Environmental Health (S55 MPH 5005, Fall, Spring)
 - g) Leading in a Technology-Rich World (T54 PRJM 581, Summer)
 - h) Cross Cultural Negotiation (T54 PRJM 586, Spring, Summer)
 - i) RESET: Renewable Energy and Decarbonizing the Grid (L82 EnSt 407, Fall)
 - j) Intro to Environmental Law (L82 EnSt 461, Fall)

Independent Study (up to 6 credits)

Students can sign up for Independent Study (E44 EECE 500) with a professor. The Independent Study could be in the form of a research project, industry-directed consulting, or an internship set up by the student. Approval by the academic advisor (via an Independent Study Petition form, available on the MEng program website or from the Graduate Administrator) is necessary for Independent Study credits. The degree earned will be MEng, even if research is done by the student under supervision of a faculty member. Up to 6 units of Independent Study credits can count towards the MEng degree. It is the student's responsibility to set up their own Independent Study; arrangements, including signing and submission of the Independent Study Petition form mentioned above, should be done in advance (during the prior semester, if possible).

Certificates of Specialization (Optional)

The EECE MEng program offers several certificates (described below) which can be used to guide your choice of courses. Careful choice of courses could result in multiple certificates.

Advanced Energy Technologies (choose total of 5 courses)

Group 1: Fundamentals (choose 2)

- a) Kinetics and Reaction Engineering Principles (E44 EECE 507, Spring)
- b) Micro-Electro-Mechanical Systems I (E37 MEMS 5801, Fall)
- c) Aerosol Science and Technology (E44 EECE 504, Fall)
- d) Atmospheric Science and Climate (E44 EECE 514, Spring)
- e) Advanced Thermodynamics in EECE (E44 EECE 502, Fall)
- f) Electrochemical Engineering (E44 EECE 574, Spring)

Group 2: Energy Generation and Conservation (choose 3)

- a) Combustion Phenomena (E44 EECE 512, Spring)
- b) Solar Energy Thermal Processes (E37 MEMS 5422, Fall)
- c) Fundamentals of Solar Energy Thermal Processes (E37 MEMS 5426, Summer)
- d) Sustainable Environmental Building Systems (E37 MEMS 5423, Fall, Spring)
- e) Wind Energy Systems (E37 MEMS 5705, Spring)
- f) Biomass Energy Systems and Engineering (E44 EECE 552, Spring)
- g) Sustainability Exchange: Community & University Practicums (E44 EECE 412, Fall, Spring, *limited seats available for graduate students*)
- h) Thermo-Fluid Modeling of Renewable Energy Systems (E37 MEMS 5424, Fall)

Energy and Environmental Management (choose total of 5 courses)

Group 1: Energy and Environmental Engineering (choose at least 2)

- a) Aerosol Science and Technology (E44 EECE 504, Fall)
- b) Environmental Organic Chemistry (E44 EECE 531, Fall)
- c) Electrochemical Engineering (E44 EECE 574, Spring)
- d) Environmental Data Science (E44 EECE 535, Spring)
- e) Aquatic Chemistry (E44 EECE 505, Fall)
- f) Physical and Chemical Processes for Water Treatment (E44 EECE 533, Spring)
- g) Environmental Resource Recovery (E44 EECE 537, Fall)
- h) Combustion Phenomena (E44 EECE 512, Spring)
- i) Biomass Energy Systems and Engineering (E44 EECE 552, Spring)

Group 2: Business/Management-Related Classes (choose at least 2, must total to at least 6 credits)

- a) Ethical Issues in Managerial Decision Making (B63 MGT 502, Fall, Spring; 1.5 credit)
- b) Introduction to Entrepreneurship (B63 MGT 521, Fall, Spring; 3 credit)
- c) Business Planning for New Enterprises [The Hatchery] (B63 MGT 524, Fall, Spring; 3 credit)
- d) Management and Corporate Responsibility (B63 MGT 529, Fall, Spring, Summer; 1.5 credit)
- e) Negotiation (B66 OB 524, Spring; 3 credit)
- f) Engineering Management & Financial Intelligence (T55 ETEM 504, Fall, Spring; 3 credit)
- g) Human Performance in the Organization (T54 PRJM 583, Fall, Spring; 3 credit)
- h) Social Entrepreneurship (B63 MGT 500T, Fall, Spring, 3 credit)
- i) The Basics of Bio-Entrepreneurship (B63 MGT 539, Spring)

Bioengineering and Biotechnology (choose total of 5 courses)

Group 1: Fundamentals (choose 2)

- a) Bioprocess Engineering I: Fundamentals and Applications (E44 EECE 506, Spring)
- b) Genomics (L41 BIOL 5488, Spring)
- c) Molecular Cell Biology for Engineers (E62 BME 530A, Spring)
- d) Physics of Biopolymers and Bioinspired Polymers (E62 BME 534, Fall)
- e) Kinetics and Reaction Engineering Principles (E44 EECE 507, Spring)

Group 2: Technology and Industry (choose 3)

- a) Biotech Industry Innovators (L41 BIOL 5014, Spring)
- b) Biomacromolecules Design and Engineering (E62 BME 542, Spring)
- c) Drug Delivery Systems: Principles and Applications (E62 BME 595, Fall)
- d) Metabolic Engineering and Synthetic Biology (E44 EECE 551, Fall)
- e) Biomass Energy Systems and Engineering (E44 EECE 552, Spring)
- f) Molecular Biochemical Engineering (E44 EECE 554, Spring)
- g) Molecular and Cellular Engineering (E62 BME 443, Spring)

Energy and Environmental Nanotechnology (choose total of 4 courses)

Group 1: Basics and Fundamentals (choose 2)

- a) Aerosol Science and Technology (E44 EECE 504, Fall)
- b) Advanced Thermodynamics in EECE (E44 EECE 502, Fall)
- c) Environmental Nanochemistry (E44 EECE 534, Spring)
- d) Electrochemical Engineering (E44 EECE 574, Spring)
- e) Measurement Techniques for Particle Characterization (E44 EECE 516, Spring)

Group 2: Applications (choose 2)

- a) Micro-Electro-Mechanical Systems I (E37 MEMS 5801, Fall)
- b) Sustainability Exchange: Community & University Practicums (E44 EECE 412, Fall, Spring, *limited seats available for graduate students*)
- c) Materials Characterization Techniques II (E37 MEMS 5604, Fall)
- d) Nanotechnology Concepts and Applications (E37 MEMS 463, Summer)

Environmental Engineering Science (choose total of 5 courses)

Group 1: Air and Aerosols (choose at least 1)

- a) Aerosol Science and Technology (E44 EECE 504, Fall)
- b) Atmospheric Science and Climate (E44 EECE 514, Spring)
- c) Advanced Thermodynamics in EECE (E44 EECE 502, Fall)
- d) Measurement Techniques for Particle Characterization (E44 EECE 516, Spring)

Group 2: Water/Aquatics (choose at least 1)

- a) Environmental Organic Chemistry (E44 EECE 531, Fall)
- b) Aquatic Chemistry (E44 EECE 505, Fall)
- c) Physical and Chemical Processes for Water Treatment (E44 EECE 533, Spring)
- d) Environmental Data Science (E44 EECE 535, Spring)
- e) Environmental Resource Recovery (E44 EECE 537, Fall)

Group 3: Policy and Practice (choose 1)

- a) Sustainability Exchange: Community & University Practicums (E44 EECE 412, Fall, Spring, *limited seats available, priority given to undergraduate students*)
- b) Environmental Policy (L11 Econ 451, Fall)
- c) Health Economics and Policy (B64 MEC 564, Fall)
- d) Intro to Environmental Law (L82 EnSt 461, Fall)