# Energy Science, Technology and Policy program

Fall 2016 Advising Notes (April 18, 2016)

**I. For Fall 2016 new-admits:** CMU Course Units; A1/A2 mini-Course Scheduling

CMU classes use a course units system rather than course credits. A typical graduate course at a U.S. university might be listed as a "4-credit course". Such a course would meet 4 hours per week, and you would typically expect to work 8 hours/ week in outside reading and assignments. CMU calls this a "12-unit class" and your full time course load in the EST&P degree is 48 units or four 12-unit classes per semester. Students in the EST&P Applied Studies three-semester more typically take a lower 42-unit semester schedule, especially during semesters when doing significant project work. The full EST&P curriculum and degree requirements are described in detail on the website.

One final point about class scheduling: CMU has many courses that run for an entire semester, and you usually see these on the Schedule of Classes as 12-unit (or occasionally 9-unit undergraduate) courses. You will also see 6-unit mini-classes listed as either an A1- or an A2-mini. An A1 mini-course runs in the first half of the fall semester only, and an A2 mini runs in the second half. You will take the 39-610 A1-mini Energy Conversion & Supply in the first half of Fall Semester 2016, and in the second half of the Fall semester you will take 39-613 A2-mini Energy Transport & Storage.

**II. Disciplinary Concentration Class Selection**

Each CMU Engineering department authorizes courses allowed to satisfy the associated EST&P disciplinary concentration requirements, and their approved courses list appears on the EST&P website and the EST&P pathways chart. Please review the (required and/or optional) courses for your disciplinary concentration prior to registration. For a complete description of the EST&P program and requirements refer to the EST&P Student Handbook on the website.

**III. Breadth Elective Course Selection**

Most engineering graduate courses are acceptable as EST&P breadth elective units, and some courses from other colleges (Tepper, Heinz, Mellon, SCS) may also be acceptable as breadth electives but may require advanced approval. As explained in the EST&P Student Handbook, "Upon consultation and advance written approval by the EST&P academic advisor, graduate level College of Engineering classes or other pre-approved graduate level classes at CMU may be selected as a breadth elective". Students are encouraged to take at least some of their breadth elective courses from outside the department associated with their disciplinary concentration. Up to 12-units of upper level undergraduate coursework (400 or 500 level) can be applied toward this requirement, when the course is needed as preparation for a graduate class. If you plan to take an undergraduate class (400 or 500 level), or a class outside the College of Engineering, you must receive EST&P advisor pre-approval to confirm the class will count towards your degree. If you choose to take courses outside of CIT, advance written approval is required for 18 units or more. Here are some options to consider when looking for breadth electives:

**BREADTH ELECTIVES - Alternatives 1:** Energy-aligned courses that meet disciplinary concentration requirements from outside your selected EST&P discipline.

**A few examples**:

| | |
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| 12-706 Civil Systems Investment Planning & Pricing | 06-623 Math.Mod. Chem.E. Processes |
| 12-712 Intro to Sustainable Engineering | 24-629 Direct Solar & Thermal Energy Conversion |
| 19-625 Sustainable Energy for the Developing World | 24-642 Fuel Cell Systems |
| 19-881 Seminar in Electric Market Restructuring | 24-722 Energy System Modeling |
| 19-683 Science, Technology, & Innov. Policy | 27-729 Solid State Devices for Energy Conversion |
| 19-624 Emerging Energy Policies | 27-728 Materials for Future Energy Systems |

**BREADTH ELECTIVES - Alternatives 2:** Engineering courses that are not energy-aligned as a disciplinary concentration course, but having content aligned with your career objectives.

**A few examples**:

| | |
|---|---|
| 12-703/24-703 Numerical Methods in Engineering | 19-687 Principles & Practices of R&D Management |
| 12-747 Sustainable Buildings | 19-694 Special Topics: Leadership & Innovation Management |
| 12-659 Special Topics: Matlab | 24-688 Introduction to CAD and CAE Tools |
| 18-601 Entrepreneurship and Innovation in Technology | 24-703 Numerical Methods in Engineering |
| 18-703 Managing & Leading Research & Development | 24-650 Special Topics in Applied Finite Element Analysis |
| 18-743 Energy Aware Computing | 39-605 Engineering Design Projects |

**BREADTH ELECTIVES - Alternatives 3:** With prior advisor approval you can count graduate level CMU classes from outside the College of Engineering that fulfill energy / engineering career objectives. On a space available basis, EST&P students may be admitted to Heinz School (Public Policy) and Tepper School (business) classes, as well as relevant courses in Physics, Math, or Computer Science. You may search the CMU schedule of classes by department and by title/topic for courses in your professional and academic areas of interest. Courses you select can be related to energy and/or engineering.

**A few examples:**

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|---|
| 45-840 Negotiations |
| 45-964 Real Options |
| 47-718 Accounting & Information Economics |
| 48-795 LEED Buildings and Green Design Concept |
| 90-765 Cities, Technology and the Environment |
| 90-808 Energy Policy |
| 10-601 Introduction to Machine Learning |

**A NOTE on Master's Project**

For the **EST&P-Applied Studies degree** (3 semesters; 120 units), a **minimum of 24 units of master's project is required** and may include independent study, internship, and pre-approved project courses such as 39-605. Project work is normally undertaken in the second and third semesters of the program. A maximum of 36 units of project can be applied toward the 120-unit EST&P-AS degree requirement. The EST&P program does not pre-arrange project or research opportunities for students, and the opportunities vary according to the needs and interests of our engineering faculty. For the two-semester EST&P degree, a maximum of 12 units of faculty-supervised master's project coursework that can be applied toward the EST&P breadth elective requirement. A one-page course of study outline, including milestones & method of evaluation, must be signed-off in advance by both faculty member and student and submitted to EST&P (form is available on Blackboard). The units must be taken for a letter grade.