

### 1. FYI for Fall 2019 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 US university might be listed as a “4-credit course”. Such a course would meet 4 hours per week, and you would typically be expected to work 8 hours per week in outside reading and assignments. CMU calls this a “12-unit class” and your full time course load in EST&P program is 48 units or four 12-unit classes per semester. A minimum of two full-time semesters are needed to complete the required 96 units of the EST&P degree. A minimum of three full-time semesters are needed to complete the required 120 units of the EST&P Applied Studies degree. A minimum of four full-time semesters are needed to complete the required 168 units of the EST&P Applied Studies and Integrated Study in Computer Science degree. EST&P degree requirements are described in detail on the website:

[www.cmu.edu/engineering/estp/degree-programs/index.html](http://www.cmu.edu/engineering/estp/degree-programs/index.html)

One final point about class scheduling: CMU has many courses that run for an entire semester, and you will see these on the Schedule of Classes as 12-unit (or occasionally 9-unit) classes. 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 and Supply in the first half of Fall Semester 2019. In the second half of the semester you will take 39-613 A2-mini Energy Transport and Storage. Thus there is no conflict despite these classes being listed on the schedule on the same days and times.

### 2. Breadth Elective Course Options

Most graduate level College of Engineering (CIT) courses are eligible to count as breadth elective units, and a few courses from Tepper and Heinz Colleges have been previously approved as breadth electives. As explained in the EST&P Student Handbook, “Upon consultation and advance written approval by the EST&P academic advisor, graduate level CIT classes or pre-approved graduate level classes at Carnegie Mellon may be selected as a breadth elective”. Students are encouraged to take 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:

**OPTION 1:** energy-related courses from another EST&P disciplinary concentration. A few examples of Fall 2019 courses EST&P students may wish to consider from concentrations outside their discipline:

12-704 Probability & Estimation Methods for Engineering Systems

12-706 Civil Systems Investment Planning & Pricing      24-643 Energy Storage Materials and Systems

12-712 Sustainable Engineering Principles      19-624 Emerging Energy Policies

19-881 Seminar in Electric Market Restructuring      24-722 Energy System Modeling

**OPTION 2:** other engineering courses not listed as EST&P disciplinary concentration. Examples such as:

39-605 Engineering Design Projects      12-709 Data Analytics for Engineered Systems

19-603 Data Science for Technology, Innovation and Policy

19-687 Managing Research, Development and Innovation      19-694 Leadership & Innovation Management

**OPTION 3:** With prior advisor approval you can count graduate level CMU classes that fulfill energy / engineering career objectives. On a space available basis, EST&P students may be admitted to Heinz School or Tepper School 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 can be related to energy as well as the professional practice of engineering. A few examples:

45-964 Real Options

48-722 Building Performance Modeling

48-795 LEED, Green Design and Building Rating in Global Context

Finally, for EST&P degree students, you may consider taking up to 12 units of faculty-supervised master’s project coursework that can apply 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 (the form is available on Canvas). The units must be taken for a letter grade.