

Syllabus for ECE-ME Senior Design Projects I and II
EECE 487 / ME 493 and EECE 488 / ME 494 (main courses)
EECE 486 / ME 498 and EECE 489 / ME 499 (lab courses)
Fall 2018 and Spring 2019

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Catalog Descriptions

Senior Project I (EECE 487/ME 493) Design projects in cooperation with local industry and other external clients. Includes specifications, budget, schedule, and design. Hold periodic design reviews with client, written and oral progress reports, and presentation. Evaluation based on individual and team performance.

Senior Project II (EECE 488/ME 494) Coordination of group project with unique industrial problem. Analysis, design, experimentation may be brought to bear on solution. Realization of results from final design of product or process with critical evaluation by a judging panel.

Fall Prerequisites

- Senior standing
- Electrical and Computer Engineering: EECE 387
- Mechanical Engineering: ME 391, ME 392, ME 351, and ME 372

Spring Prerequisites

- EE 487 or ME 493

Co-requisites

- One-credit lab section in project Faculty Advisor's department (EECE 486 and 489 for ECE faculty, ME 498 and 499 for ME faculty)

Teaching Assistants and Resources

- Teaching Assistant (TA) joint account (wcpta@Binghamton.edu) used for all submittals
- Academic resources, assignment grades posted on MyCourses
- Course calendars provided on WCP.Binghamton.edu/info
- Project resource documents, etc. also online (see WCP.Binghamton.edu/info)
- Students required to have a basic set of personal hand tools
- Wide variety of lab equipment, available on request
- Practical skills workshops offered by Watson School technicians

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Course Objectives (ABET)

At the end of the second semester, students will be able to, or have:

- ABET a - Apply engineering knowledge and tools to the design
- ABET c - An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- ABET d - Work effectively in multi-disciplinary design teams
- ABET e - Identify, formulate, and solve engineering problems
- ABET f - An understanding of professional, ethical responsibilities
- ABET g - An ability to communicate effectively
- ABET h - Understand the impact of engineering solutions in a global, economic, environmental, and societal context
- ABET i - Recognize need for, ability to engage in life-long learning
- ABET j - A knowledge of contemporary issues

Course Overview

In their Senior Design Project courses, students work together in Watson Capstone Projects (WCP) to execute a team-based design project with scope, cost, and time constraints.

Senior Design is the culmination of four years of engineering instruction and study. Each team will use the Engineering Design Process (EDP) to identify, design, build and test their project. Successful completion of the project using the EDP will provide professional and practical understanding regarding the complexity associated with design projects.

The project portion of the course is to result in a fully tested, integrated, functional, and well-documented design that has been delivered to the customer. In addition to requiring the technical skills of design and analysis, this course addresses many of the soft skills mandated by ABET: communication, teamwork, self-directed learning, ethics, global awareness, and the engineer's role in society,

Course Lectures

- Engineering design process, project development life cycle
- Communications, teamwork, leadership
- Engineering safety, Watson Project Labs safety
- Requirements, verification methods, system verification
- Integration, test, requirements traceability
- Project planning, scheduling, finances
- Professional ethics
- Resumes and interviewing
- Additional topics (e.g., engineering economics, entrepreneurship, human factors, intellectual property, sustainability)

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Course Projects

There are external and internal projects. External projects come from outside of the ECE and ME departments (e.g. industry-sponsored). Internal projects are submitted by members of the ECE and ME departments. Student-initiated projects may be internal or external.

Project Characteristics

- Design a project prototype, over two semesters, within cost and time constraints.
- Follow the WCP Statement of Work and Command Media requirements.
- Start from initial customer requirements, and prepare a system specification.
- Seek out assistance for complicated designs.
- Find authoritative sources for critical information.
- Analyze alternative solutions and create a conceptual design, then a detailed design.
- Progress through the build, integration, testing, verification, documentation, and delivery.
- Develop and maintain project documents; prepare periodic status reports.
- Finish with a fully functional prototype and demonstrate, through testing traceability, that its requirements have been met.

Project Teams

- Students will submit a personal skills assessment and indicate their projects preferences.
- Students will be assigned to project teams by the instructors, based on the needs of each project. There will typically be three to six students per team.
- Students will self-organize their team, following WCP guidelines.
- Teams must have internal team meetings at least weekly.
- Teams should meet with Faculty Advisors once each week.
- Each team member must take part in the oral briefings to their Faculty Advisor.
- Teams with an Industry Mentor should meet with them approximately every other week.
- Team status presentations and action item summaries are required.
- Teams and students are to submit combined weekly status reports.

Project Funding

- Projects are authorized up to a specified amount depending on various factors. Teams will be told their funding limit upon project assignment.

WCP Command Media

The WCP Command Media is our collective name for the syllabus, master statement of work, common data requirements, ground rules, safety briefings, operating procedures, etc. by which we run the WCP 'business', and by which all students and projects teams must abide. Provided to students online (see WCP.Binghamton.edu/info), it defines the activities and procedural details of the project-related aspects of the course. Please read it before asking questions.

Major Deliverables

All team assignments are due to your Faculty Advisor one week before the class due date. This will allow the advisor to give you feedback, and allow you to make the recommended changes.

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Fall Semester

1. The Project Specification, with detailed requirements, is due soon after the teams are assigned their projects. Specifications can be revised later only with Faculty Advisor, Industry Mentor (if applicable), and WCP Director approval.
2. A Conceptual Design Presentation is due in mid-semester.
3. The project Design Report is due late in the semester.
4. A twenty-minute project Design Presentation to an audience of peers and an industry review panel will be given at the end of the semester (typically the last Friday of classes).

Spring Semester

5. An Integration and Test Plan is due in early in the semester.
6. The System Verification Procedures are due in mid-semester.
7. A Project Experience Video is due late in the semester.
8. The Project Report is due late in the semester.
9. A twenty-minute Project Presentation given at semester end (typically last Friday of classes).
10. Each team's final prototype is due by the end of the semester. It should be a fully functioning system, a scale model, a software program, etc., as appropriate for each project.
11. A team exhibit is expected at the WCP Expo at the end of the semester.

Specific due dates and submission requirements are in the Common Data Requirements List.

Course Grading

1 credit: Faculty Advisor's grade, based on technical merit, teamwork, project quality, etc.

2 credits: Course Instructors' grade:

- 20%: Individual's exams, weekly status reports, etc.
- 10%: Project launch, team's weekly presentations, project close-out, etc.
Project team's deliverable data items (fall; spring):
- 15%: *Project Specification; Integration and Test Plan*
- 15%: *Conceptual Design Briefing; System Verification Procedures*
- 25%: *Design Report; Project Report*
- 15%: *Design Presentation; Project Presentation*

Default late penalty: 5% per BU class day.

Grading Distribution

A	$\geq 93.0\%$	C+	77.0% to $< 80.0\%$
A-	90.0% to $< 93.0\%$	C	73.0% to $< 77.0\%$
B+	87.0% to $< 90.0\%$	C-	70.0% to $< 73.0\%$
B	83.0% to $< 87.0\%$	D	60.0% to $< 70.0\%$
B-	80.0% to $< 83.0\%$	F	$< 60.0\%$

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Policies

Academic Honesty

All students must adhere to the Student Academic Honesty Code of the University (http://bulletin.binghamton.edu/program.asp?program_id=826). A standard policy to enforce these codes has been adopted. Category I violations will result in a grade of 0 for the graded work plus a one letter course grade reduction. Category II violations will result in a failing grade for the course. The violation categories are defined in the link above. In both cases, a *Report of Academic Dishonesty* form is filed with the Provost's Office. All offenses after the first are automatically considered to be Category II offenses and result in a failing grade for the course.

Attendance

Attendance is required unless otherwise designated. Email the ME-ECE Chief Instructor to request permission to be absent *before* the lecture if ill or needing to go to a job interview, etc.

Grade Questions

Questions about Faculty Advisor course grades must be addressed to them. Any questions about main Senior Design grades must be made within one week of the assignment grade posting (or for final Fall grades, in the first week of the Spring Semester). Questions about grades must be made in person to a course TA, with follow-up questions to the ME-ECE Chief Instructor within one week of the meeting with a TA. Emails about grades will not be accepted.

Safety

Safety violations may result in you being banned from the Watson Project Labs.

Sickness

Students, if you have a fever, body aches, cough, and/or sore throat, please do not come to class. You must still request to miss class before class starts. The university recommends that you remain at home or in your room and follow instructions from the University's Health Services (www2.binghamton.edu/health/). Every effort will be made to accommodate make-up work. Note that it is considered a violation of the academic honesty code if you abuse this policy for non-medical reasons. For health and sickness information, see the CDC site at www.cdc.gov.

Project-related Requests

Most project-related requests require the concurrence of the team's Faculty Advisor, so get it first with your advisor doing a "Reply All" on the request to the WCP Director.

Work Effort

These are 3-credit courses (including Faculty Advisor 'lab' sections), which means that students are expected to do at least 9.5 hours of course-related work or activity each week during the semester. This includes scheduled class meeting times as well as time spent completing assigned readings, studying for tests and examinations, participating in lab sessions, preparing written assignments, and other course-related tasks.