

Winter 2018

To: ISE 4491 Students and SECS Faculty

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Subject: Syllabus for ISE 4491 Senior Design

O.U. Course Catalog Description.

ISE 4491 Senior Design (4)

Capstone design project selected from manufacturing systems, automotive or industrial systems, instrumentation and measurement, and control systems. Develops system approach to design: preparation of specifications, scheduling, modeling, simulation, and technological, financial and environmental aspects. Teamwork is emphasized. *Satisfies the university general education requirement for the capstone experience. Satisfies the university general education requirement for a writing intensive course in the major. Prerequisite for writing intensive: completion of the university writing foundation requirement.*

Prerequisites: ISE 3318, 3330, 3341 and major standing.

Prerequisites with concurrency: ISE 4483 or 4484.

O.U. General Education Requirements. This course satisfies the following O.U. general education course requirements.

1) Capstone Experience. The student will demonstrate the following.

- The appropriate uses of a variety of methods of inquiry and a recognition of ethical considerations that arise.
- The ability to integrate the knowledge learned in general education and its relevance to the student's life and career.

2) The student will integrate knowledge from Natural Science and Technology Knowledge Exploration Area of General Education as well as demonstrate the following General Education Cross-Cutting Capacities.

- Effective Communication: Exhibited through extensive written and verbal communication exercises and assignments.
- Critical Thinking: Developing novel and innovative solutions to technological problems.
- Social Awareness: Considering and allowing for multicultural aspects of the global marketplace as technical solutions are sought that are socially responsible and culturally appropriate.
- Information Literacy: Finding, evaluating and utilizing information to assess and develop innovative and creative solutions to technical solutions that are socially responsible and culturally appropriate.

ISE 4491 Course Objectives. The student will demonstrate, and exhibit proficiency in, all of the ISE Student Outcomes (a-k). In particular, students will be required to gather, investigate, evaluate and assess information to successfully achieve a technological solution to an engineering problem, including realistic constraints such as safety, economic factors, reliability, aesthetics, ethical considerations and societal impact. In addition, students will have to draw on their prior knowledge, including and especially that obtained in general education coursework, to develop appropriate, sensitive and successful engineering designs.

The successful student will be able to:

- (a) Demonstrate an ability to apply knowledge of mathematics, science, and engineering.
- (b) Demonstrate an ability to design and conduct experiments, as well as to analyze and interpret data.
- (c) Demonstrate 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.
- (d) Demonstrate an ability to function on multi-disciplinary teams.
- (e) Demonstrate an ability to identify, formulate, and solve engineering problems.
- (f) Demonstrate an understanding of professional and ethical responsibility.
- (g) Demonstrate an ability to communicate effectively.
- (h) Demonstrate the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- (i) Demonstrate a recognition of the need for, and an ability to engage in life-long learning
- (j) Demonstrate a knowledge of contemporary issues.
- (k) Demonstrate an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Course Procedures. The purpose of this class is to have undergraduate ISE students apply the principles of successful engineering design and to guide students through practical design experiences. While there will be no formal lectures, the following topics will be demonstrated through practical example.

- 1) Design process: Objectives and criteria, synthesis, analysis, construction, testing and evaluation.
- 2) Design constraints: Safety, economic factors, reliability, aesthetics, ethics and societal impact.

Course Website. All course materials are available from Moodle at:

moodle.oakland.edu

Grading. All grading in this course will be based on the quality of design work, its analysis and subsequent verbal and written presentations. All of the projects in this course will be team efforts. Students will also be required to:

- submit a design proposal (one per team);

- submit a quarterly activities report (each individual, total of 4 reports);
- submit weekly progress form (each individual);
- submit a mid-term progress report including an executive summary (one per team);
- make a mid-term progress presentation and submit slides of the presentation (one per team);
- submit a final report including an executive summary (one per team); and
- make a final presentation and submit slides of the presentation (one per team).
- complete an end-of-semester online peer team evaluation (each individual).

The final grade in the course will consider team participation and online peer evaluation, progress made in the projects, input from project supervisors and overall engineering practice. Particular emphasis will be placed on how well students analyze their designs through mathematical or simulation models, justify their engineering decisions and present the results of their analyses and designs.

The final course grade for each student will be a weighted average of the following.

- Team and class participation (attendance and contributions at team meetings and presentations): 15%
- Design proposal: 5%
- Quarterly activity reports: 10%
- Mid-term progress report: 15%
- Mid-term progress presentation: 15%
- Final design report: 20%
- Final design presentation: 20%

Weekly Design Review Meeting. Each design team will schedule a weekly design review meeting with the instructor to be held in room 502 EC. At this meeting, each design team will meet with the instructor as a group and deliver an informal verbal progress report. In addition, each student will turn in their individual weekly progress forms to the instructor (forms available from Moodle) The progress form will concentrate on what has been accomplished in the previous week and what is planned for the upcoming week. Each student must submit an individual weekly progress report.

Design Proposal. Each team must submit a written design proposal using the template provided (available from Moodle). The design proposal is to ensure that each team understands the problems to be solved and has made a concrete plan to develop a system that has the potential to solve every aspect of the design problem. It is understood that this is an initial design proposal and that the design will evolve resulting in frequent changes to the initial design. Thus, the team will not be held to the specifics of their design proposal.

Quarterly Activity Reports. Each student must submit a quarterly activities report that detail their activities for that quarter of the semester as well as provide the current status of the project. This report is limited to a maximum of 1 page. Students are required to submit a draft of their report to the OU Writing Center and incorporate their feedback prior to submitting the report.

Project Manager. Each design team will select a project manager or team leader. The project

manager will be the main contact for the team, will usually present the weekly progress reports and be responsible for the internal communications within the team. The project manager must be identified to the instructor by the time the design proposal is submitted.

Presentations. The mid-term and final presentations should "tell the story" of the design project. The overall emphasis of both of these presentations is to have your audience understand what you did, why you did it and how your system works. You are to avoid equations and listings of computer programs. Explain your design through drawings, photos, demonstrations, video clips, block diagrams, flowcharts, etc.

Each team will present for 12-15 minutes, not including questions. A crisp 12 minute presentation is far better than a disorganized 15 minute one. Note your team will be abruptly cut off at the 15-minute time limit, even if you are not finished. All team members should participate equally in the presentation.

The mid-term progress presentation is to tell the story from the first day of class to the presentation date, including a detailed statement of the problem and describing what was considered and explored as well as what needs to be done to complete the project. The final presentation must be complete and contain details of each subsystem and component of your design.

The presentations must be prepared according to the specified guidelines and format (available from Moodle). The opening slide of your presentations should contain the names and photos of all team members. Also, the names and titles of all personnel working on your project from the company you are working with should be included in the presentation.

Mid-term Progress Report and Final Report. The reports must be prepared according to the specified guidelines and format (available from Moodle).

Course Evaluation. Each student in the course is expected to fill out an online course evaluation, directions will be emailed to you towards the end of the semester. In addition, *each student must fill out online peer team evaluations* at:

<http://assessments.clust.secs.oakland.edu/assessment/peerteaminput.asp>

In addition, graduating seniors are expected to submit an exit survey at:

http://assessments.clust.secs.oakland.edu/assessment/survey_exit.asp

Academic Conduct. Students are expected to read, understand and comply with the *Academic Conduct Policy of Oakland University*, found in the Schedule of Classes and in the Oakland University Undergraduate Catalog. Suspected violations will be taken before the Academic Conduct Committee. Students found guilty of academic misconduct in the course will receive a grade of 0.0 in addition to any penalties imposed by the Academic Conduct Committee.

Add/Drops. The University add/drop policy will be explicitly followed. It is the student's responsibility to be aware of the university deadline dates for adding or dropping the course.

Special Considerations. Students with disabilities who may require special considerations should make an appointment with campus Disability Support Services. Students should also bring their needs to the attention of the instructor as soon as possible.