

1. Course number and name: GE 494/495 – Senior Engineering Project
2. Credits and contact hours: 5 Credit hours (GE 494 – 3 credits of project team grade, GE 495 – 2 credits of individual grade. Contact hours: 8 lectures, 4 presentations, weekly advisor meetings, several plant trips on an “as needed” basis.
3. Instructor or course coordinator’s name: Harry Wildblood (Lecturer, Coordinator) and several individual project advisors/graders from the ISE faculty and adjuncts.
4. Textbook(s) and/or other required material: No Textbook, course handbook, and other supplemental materials, e.g. lecture notes, sample reports and presentations are provided to the students electronically.
5. Specific course information
  - a. Course description: The senior engineering project provides senior engineering students with a real-world engineering project experience for an external industry partnering company in a commercial engineering environment. Each student team must work with the industry partner to understand the project description, scope of work and deliverables, and then perform an initial analysis with metrics to determine the current status of the design, product, process, or system being analyzed. A preliminary economic analysis will determine the maximum budget for eventual recommendations. Solutions will be developed by the project team, along with deliverables such as drawings, prototypes, software, etc. Solutions will be supported by an economic analysis, including net cash flow diagram(s), IRR, NPV, and simple payback period. Four presentations will be given, including an on-site presentation at the industry partner site during weeks eleven or twelve. Four sequential reports will be generated and graded by a two-faculty grading committee, including the complete final report which is graded, edited, and sent to the industry partner as the primary deliverable of the project. Each project is advised by a faculty advisor dedicated to the project team of three to four students. Trips to the client site are made on an as-needed basis and will vary from project to project.
  - b. Prerequisites or co-requisites: Prerequisite: GE 311, IE 300, IE 310, and TAM 335; or IE 430, IE 310, IE 311, and IE Technical Elective; credit or concurrent registration in a GE Design Elective and IE Engineering Science Elective. Must enroll concurrently in GE 495
  - c. Required or elective: Required for all GE and IE undergraduates
6. Specific goals for the course
  - a. specific outcomes of instruction:
    - Define a project scope with technical engineering and economic goals to be met [e, h]
    - Develop and define specifications to be achieved in a design [c, e, g]
    - Identify and use the governing equations for the engineering project [a, e]
    - Work in a team to analyze, solve, develop, present, write project/problem solutions [d]
    - Communicate effectively with industry partner personnel through written & oral communication [d, g]

- Develop, design tests and/or experiments for solution development & evaluation, [b, c]
  - Use applicable engineering standards and practices in solution development and evaluation, [f, h, j]
  - Develop presentations and reports to demonstrate and motivate solution adoption, supported by economic analysis, [d, j, k]
  - Use applicable software (CAD, FEA, CFD, simulation, etc.) in solution development, [i, k]
- b. explicitly indicate which of the student outcomes listed in ABET Criterion 3 or any other outcomes are addressed by the course:
- (a) Ability to apply mathematics, science and engineering principles.
  - (b) Ability to design and conduct experiments, analyze and interpret data.
  - (c) Ability to design a system, component, or process to meet desired needs.
  - (d) Ability to function on multidisciplinary teams.
  - (e) Ability to identify, formulate and solve engineering problems.
  - (f) Understanding of professional and ethical responsibility.
  - (g) Ability to communicate effectively.
  - (h) The broad education necessary to understand the impact of engineering solutions in a global and societal context.
  - (i) Recognition of the need for and an ability to engage in life-long learning.
  - (j) Knowledge of contemporary issues.
  - (k) Ability to use the techniques, skills and modern engineering tools necessary for engineering practice.
7. Brief list of topics to be covered: Note: due to the custom nature of each project, the items below may vary somewhat in content and duration.
- Project initiation, working with company client, communication
  - Problem scoping and definition of specifications
  - Development of technical presentations
  - Technical writing and report structure
  - Personal and organizational safety and applicable standards
  - Development, compare and select engineering solutions
  - Economic analysis
  - Giving presentations (initial, midterm, on-site, final)
  - Write reports (initial, midterm, draft final, final)
  - Development of prototypes in applicable projects
  - Engineering ethics, life-long learning, engineering standards
8. Grade determination:
- c. GE 494 grades are determined by a grading committee of two faculty who review four reports and four presentations during the semester and give feedback to the student team. The fourth and final report is assigned a letter grade by the grading committee which becomes the course grade which is shared by all team members. If it is determined that one or more students do not significantly contribute to the project and report, their GE 494 grade may be changed or they may be given an incomplete for the course.
  - d. GE 495 grades are individual grades to each team member and are assigned by the project advisor with regard to student attendance, participation, peer evaluations, etc.