1. Course number and name: SE 494/495 – Senior Engineering Project

2. Credits and contact hours: 5 Credit hours (SE 494 – 3 credits of project team grade, SE 495 – 2 credits of individual grade). Contact hours: 10 lectures, 4 presentations, weekly advisor meetings, plant visits for initial meeting, on-site presentation about week 11 or 12, and others on an "as needed" basis.

3. Instructor or course director's name: Thomas A. Titone (Lecturer, Director) 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 with an external industry partnering company in a commercial engineering environment. Each project includes 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. 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 determines the maximum budget for eventual recommendations. The project team develops solutions, along with deliverables such as drawings, prototypes, software, etc. Project team support solutions through both engineering and economic analysis, including net cash flow diagram(s), IRR, Present Worth, and simple payback period. Project teams deliver four presentations, including an on-site presentation at the industry partner site during weeks eleven or twelve. Students generate four sequential reports. A two-faculty grading committee grade the reports which include the complete final report. Students receive feedback then edit the final graded report prior to delivering the report to the industry partner as the primary project deliverable.

   b. Prerequisites or co-requisites: SE 261, SE 290 and; SE 311, IE 300, IE 310, and TAM 335; or IE 310, IE 311, and IE Technical Elective; credit or concurrent registration in a SE Design Elective and IE Engineering Science Elective. Must enroll concurrently in SE 495.

   c. Required or elective: Required for all SED 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 [1a, 1b, 2, 4b]
      - Develop and define specifications to be achieved in a design [1a, 1b, 2, 4b]
      - Identify and use the governing equations for the engineering project [1a, 1b]
      - Work in a team to analyze, solve, develop, present, write project/problem solutions [5]
      - Communicate effectively with industry partner personnel through written & oral communication [3, 5]

- Develop, design tests and/or experiments for solution development & evaluation, [4a, 4b, 6, 7]
- Use applicable engineering standards and practices in solution development and evaluation, [2, 7]
- Develop presentations and reports to demonstrate and motivate solution adoption, supported by economic analysis, [3, 5]
- Use applicable software (CAD, FEA, CFD, simulation, etc.) in solution development, [1b, 2, 6, 7]

b. explicitly indicate which of the student outcomes listed in ABET Criterion 3 or any other outcomes are addressed by the course:

1a. an ability to identify, formulate, and solve complex engineering problems
1b. an ability to apply principles of engineering, science, and mathematics in complex engineering problems
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4a. an ability to recognize ethical and professional responsibilities in engineering situations
4b. an ability to make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

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 liability with applicable standards
- Develop, compare and select engineering solutions
- Economic analysis
- Giving presentations (initial, midterm, on-site, final)
- Write reports (initial, midterm, draft final, final)
- Development of prototypes or simulations in applicable projects
- Engineering ethics, life-long learning, engineering standards

8. Grade determination:
All grades are 90% as stated in items 8.a. and 8.b with 10% course director determined by overall assessment, class participation, peer evaluation and industry partner feedback.

a. SE 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 shared by all team members who significantly contribute to the project deliverables, otherwise one or more students may receive a different grade or an incomplete for the course.

b. SE 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.

Course Calendar

Spring 2023 Semester Calendar

Legend: Blue Lecture, Green Assignment, Orange Advisor or Grader Actions, Red Company Involvement

Sun	Mon	Tue	Wed	Thu	Fri	Sat
Jan 15	*Jan 16*	*Jan 17*	*Jan 18*	*Jan 19*	*Jan 20*	*Jan 21*
- 1 -	Instruction Begins	*9:00 am Lecture ADVISOR & Student Project Vote by Noon		*9:00 – 10:30am Call Company to Schedule Site Visit	Upload Combined Schedules to Canvas	
Jan 22	*Jan 23*	*Jan 24*	*Jan 25*	*Jan 26*	*Jan 27*	*Jan 28*
- 2 -	---------- All Groups & Advisors travel to Companies during this week ----------					
Jan 29	*Jan 30*	*Jan 31*	*Feb 1*	*Feb 2*	*Feb 3*	*Feb 4*
- 3 -		*10:00 am Lecture Abstract Assginment	Company contacts, team photo, plant visit checklist to Canvas, Schedule meeting with Dr Titone	*10:00 am Lecture Abstract Feedback	Company Feedback	
Feb 5	*Feb 6*	*Feb 7*	*Feb 8*	*Feb 9*	*Feb 10*	*Feb 11*
- 4 -		*10:00 am Lecture		*10:00 am Lecture		
Feb 12	*Feb 13*	*Feb 14*	*Feb 15*	*Feb 16*	*Feb 17*	*Feb 18*
- 5 -		*10:00 am Lecture		9:00 am Presentation #1	Pre-Report & signed P.D. to Canvas & Box (GRADER)	
Feb 19	*Feb 20*	*Feb 21*	*Feb 22*	*Feb 23*	*Feb 24*	*Feb 25*
- 6 -		*10:00 AM Lecture GRADER Pre-Report Feedback			Company Feedback	
Feb 26	*Feb 27*	*Feb 28*	*Mar 1*	*Mar 2*	*Mar 3*	*Mar 4*
- 7 -		*10:00 am Lecture		Outline & Midterm Draft to Advisor (ADVISOR)		
Mar 5	*Mar 6*	*Mar 7*	*Mar 8*	*Mar 9*	*Mar 10*	*Mar 11*
- 8 -		*10:00 AM Lecture ADVISOR Midterm Feedback Due	EOH Poster DUE	Midterm to Canvas & Box Colleague Eval From to Advisor (GRADER)		
Mar 12	*Mar 13*	*Mar 14*	*Mar 15*	*Mar 16*	*Mar 17*	*Mar 18*
- 9 -	---------- !!!!!!!!!!!!!!!SPRING BREAK!!!!!!!!!!!!!!!!! ----------					
Mar 19	*Mar 20*	*Mar 21*	*Mar 22*	*Mar 23*	*Mar 24*	*Mar 25*
- 10 -		*10:00 AM Lecture GRADER Midterm Feedback Due		Revised Midterm to Canvas and Company	Company Feedback EOH Poster Vote Due	
Mar 26	*Mar 27*	*Mar 28*	*Mar 29*	*Mar 30*	*Mar 31*	*Apr 1*
- 11 -		*10:00 am Lecture		Presentation #2		
Apr 2	*Apr 3*	*Apr 4*	*Apr 5*	*Apr 6*	*Apr 7*	*Apr 8*
- 12 -	---------- All Groups give Presentations at Companies during this week ----------					
Apr 9	*Apr 10*	*Apr 11*	*Apr 12*	*Apr 13*	*Apr 14*	*Apr 15*
- 13 -		*10:00 am Lecture		Draft Report to Advisor (ADVISOR)	Company Feedback	
Apr 16	*Apr 17*	*Apr 18*	*Apr 19*	*Apr 20*	*Apr 21*	*Apr 22*
- 14 -		*10:00 AM Lecture ADVISOR Draft Feedback Due		Draft to Canvas & Box (GRADER)		
Apr 23	*Apr 24*	*Apr 25*	*Apr 26*	*Apr 27*	*Apr 28*	*Apr 29*
- 15 -		*10:00 am Lecture GRADER Draft Feedback Due		Invite Company to Final Presentation		
Apr 30	*May 1*	*May 2*	*May 3*	*May 4*	*May 5*	*May 6*
- 16 -		No Lecture	Final Report Due to Canvas & Box	Reading Day		
May 7	*May 8*	*May 9*	*May 10*	*May 11*	*May 12*	*May 13*
- 17 -			GRADER Final Report Feedback Due	Final Graded Reports, Exit Procedures, all deliverables per Checklist	Final Presentations & Reception with Advisors and Company 8:00am-1:00pm	GRADER ADVISOR student and project grades due