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. Student outcomes listed in ABET Criterion 3 and other outcomes 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% of stated items in 8.a. and 8.b with 10% discerned by course director's overall assessment of student's class participation, peer evaluation, advisor feedback, grader feedback 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, responsiveness, professionalism etc.

c. Academic Honesty: Plagiarism will constitute grounds of University Sanctions including immediate failure in course for reason of academic dishonesty; see https://studentcode.illinois.edu/article1/part4/1-402/

Course Calendar

Fall 2023 Semester Calendar

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

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