



ISE 495abx

Senior Project Design

Fall 2023 — Friday - 9:00 am - 11:50 am
 Units: 4 (credited at conclusion of “b” semester)
 Location: GFS118

Course Description

Preparation and development of the senior project proposal. Open to those who have attained senior standing in industrial and systems engineering.

This course will prepare students for engineering practice through a major design experience based on the knowledge and skills acquired in earlier course work and incorporating appropriate engineering standards and multiple realistic constraints. This activity includes:

- Preparation and development of a senior project proposal.
- Identification and definition of appropriate engineering standards.
- Identification of constraints that will help define and bound the project proposal.

This course serves as the experiential capstone in USC’s undergraduate ISE curriculum. Students apply their classroom knowledge to a real project in a real ISE work setting, e.g., on the manufacturing floor, in a healthcare clinical setting, at logistics distribution facilities, etc.

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Text: Product Development for Technical and Non-Technical Managers and Practitioners, 1st Ed., Lu, P. Kendall Hunt (2021), ISBN: 978-1-7924-7707-2. Available at USC bookstore, Amazon or from publisher at: https://tinyurl.com/4rc99deh Rentals are not available at this time.	

USC’s first priority is the education of our students. Our goal includes graduating engineers capable of serving the public good, reaffirming their commitment to core academic principles and equipping our graduates to face contemporary global challenges.

Prerequisites

495ax	495bx
ISE225 – Engineering Statistics	ISE 315 – Engineering Project Management
ISE382 – Database Systems	ISE 370 – Human Factors in Work & Systems Design
	ISE435 – Discrete Systems Simulation
	ISE495a – Senior Design Project

Learning Objectives

The students in ISE 495abx will learn to:

- **Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics**
- **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, economic factors and client requirements / objectives**
- **Communicate effectively with a range of audiences**
- **Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts**
- **Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives**
- **Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions**
- **Acquire and apply new knowledge as needed, using appropriate learning strategies.**

Expectations of Team Members

Punctuality is considered in the evaluation of performance. This relates to meetings of your team, punctual class attendance, and scheduled meetings with the instructor(s). Absence or extreme tardiness of a chronic nature will be noted. There are no extra credit assignments or makeup assignments for missed or late work. A commensurate score will be assigned if a team member is absent or late. (see corresponding rubric for details)

You must submit a completed and approved PDR to receive an IP (In Progress) grade for **ISE 495ax**. If circumstances beyond the team's control emerging after the 12th week of class, preclude this outcome, a grade of IN (Incomplete) will normally be issued, to be cleared as soon as possible during the next academic semester. Incomplete grades can usually be avoided.

Format of the ISE Senior Project Design Sequence

The centerpiece of the 495 experience is the systems development life cycle (SDLC). The SDLC process is a multistep, iterative process structured in a methodical way to provide a framework for technical and

non-technical activities to deliver a quality system. Please refer to the “Outline of Major Technical Reviews and Final Report for requirements.

Team participation

Students are organized into teams and each team is assigned to solve a representative industrial and systems engineering project for a client, typically a local firm, nonprofit entity, or public agency. Any number of different manufacturing, service, or business enterprises in any sector might be a source of projects. The expectation is for the team is to research a solution set to address the project parameters, use engineering techniques to reduce risk while developing a mature solution that can be thoroughly developed and tested for implementation by the client. This is a team project activity. As such, it is expected that management of the team will be accomplished within the team.

Faculty (Coach's) participation

The faculty delivering the course act as coaches, offering feedback at specific milestones and meeting regularly with individual teams to discuss activities, progress, and options; and to offer advice. It is not the faculty's task to identify or repudiate blockers of the team's progress. However, please review the [resources](#) at the end of the syllabus or initiate a confidential complaint to your coaches if you feel a more egregious violation has occurred.

Case Studies

Case studies are assigned throughout the term. These are intended to provide situational context to assist students unfamiliar with working in industry and guidance in developing the various Technical Reviews. These studies are presented in a Team format and peer reviewed in class. Your presence is required to receive full credit.

Using the Case Method in this Course

The principal objective of the case study method is to develop student skills in problem solving and decision making. In studying a case, the student's task is to assume the role of the decision maker and consider all the information available to the decision maker at the time of the case.

The quality of your case analysis as a surrogate for experience depends on the same factors as the quality of experience in the real world. The student must review the case thoroughly to derive maximum benefit from the discussion. To base an analysis of a case on one or two isolated facts may enable a student to make a "contribution" to the discussion, but it is unlikely to constitute a worthwhile learning experience.

Although there is rarely a single "right" answer to a case problem, there may be several wrong ones - at least, "wrong" in the sense that it is difficult to convince anyone else that the decision proposed is reasonable. Experience will tend to show that bringing an opinion to a case is not the same as an analysis that is based on logic, the case facts, course concepts, and assumptions that other members of the class are willing to accept as reasonable. In addition, be careful to avoid looking for a single message in each case. You may find only the one that you forced yourself to see. Do not be disappointed if a class ends with more uncertainty about the decision than was apparent when it began. Indeed, confusion is sometimes a higher state of knowledge than ignorance.

Recommended Preparation:

Both ISE 225 and ISE 382 are pre-requisites for this course. Techniques and tools used in those courses may be used extensively in this course. Use of database architecture or database system may also be

used in your project. Your knowledge of these topics and ready access to these references will be of assistance in successfully completing your project.

ISE 495ax is Web-Enhanced with high reliance on Blackboard. Readings and supplementary materials will be posted to Blackboard as needed, accompanied by a posting on Announcements. All assignments will be submitted via Blackboard. No assignments will be accepted by email or paper unless arrangements have been made in advance. Copies of lecture slides and other class information will be posted on Blackboard. Supplementary materials and other reference guidance will be posted to Blackboard under *Content*.

Grading

Grading Scale

Course final grades will be determined using the following scale

A	93 – 100
A-	90 - 92
B+	87 – 89
B	83 – 86
B-	80 - 82
C+	77 – 79
C	73 – 76
C-	70 – 72
D+	67 – 69
D	63 – 66
D-	60 - 62
F	59 and below

Grading Breakdown

Course Component	Weight
(SFR) System Functional Review (client approval required before progressing to PDR)	10%
(PDR) Preliminary Design Review Presentation, Report & Exit documents (Client approval required before progressing to CDR and conclude 495a)	10%
(CDR) Critical Design Review and Exit (Client approval required before progressing to TRR) <ul style="list-style-type: none">• Presentation• Report	15%
(TRR) Test Readiness Review (client approval required before to SVR) <ul style="list-style-type: none">• Report (5%)• Presentation (5%)	10%
(SVR) System Verification Review (client approval required to conclude 495ab) <ul style="list-style-type: none">• Presentation (10%)• Report (15%)	25%
Client Review	15%
Case Study <ul style="list-style-type: none">• Case Study & Participation	15%
Total (4-unit course; grades posted at end of 495b)	100%

Calculation of Final Grade

Students completing **ISE 495ax** receive a grade of IP (In Progress) at the conclusion of the semester. A letter grade is assigned for both **ISE 495ax** and **495bx** at the conclusion of the **second** semester in the sequence. Students who complete **ISE 495ax** but do not continue in **ISE 495bx** the following semester receive a grade of NC (No Credit) in **ISE 495ax**. A grade of NC has no impact on a student's GPA, but no credit is earned for the course.

[Assignment Submission Policy](#)

All work submitted for grading shall be submitted through Blackboard.

Format Requirements for Submissions

- Presentations: MS Power Point (*.pptx)

(NOTE: **NEVER** assume you can present to a client by accessing your google documents. Most companies do not allow access to google tools for security reasons)

- Documents: PDF
- Project Schedules: PDF
- At a minimum, students are expected to be able to:
 - prepare professional papers and presentations in the English language using proper citation
 - use multimedia in **MS PowerPoint** with embedded audio and/or video that begins automatically with the beginning of a presentation (Please test this. Points will be deducted if embedded media do not operate properly)
 - access a computer with a web camera and microphone, preferably with a headset
 - be proficient with the use of the BlackBoard system (NO work will be accepted by email unless previous arrangements have been made)
 - convert report files to PDF

Communications Policies

When writing to Coaches –

- Please include course number (ISE495a or b) and client name in subject line of emails
- Cc: all coaches in all email

Use your USC email account when contacting the client or Coaches.

Send Calendar invitations for meetings with clients and coaches (send Outlook invite from Zoom)

Technical Review Dress Rehearsal Presentation – Coaches

The **Dress Rehearsal** presentation is the review of the PDR prior to presentation to the client. As such, content should be complete and PDR ready. There is probably much more each team will want to say at this point, but the purpose of the **Dress Rehearsal** is only to understand and approve the strategy for the **Final Presentation**. Teams are **strongly** encouraged to make available detail information in a separate file, submitted to *Bb* for review if the instructors have any questions.

The objective of the coaches' feedback is to position the team to execute a successful project. Teams are sometimes asked to revise the presentation and execute it again if the coaches do not believe this standard has been met. A single **Dress Rehearsal** presentation may suffice.

Please Do Not decide with the client for the **Final Presentation** until the presentation has been reviewed and approved by the coach, even if the client presses you to do so.

Schedule

The Calendar is **approximate** and **subject to change**, especially this year. The teams and clients are working in an uncertain environment. This is a living document and will be modified as needed based on the course requirements.

Presentations are to be coordinated and scheduled with your coach.

Week	Friday	In Class	Activity	Deliverable (Friday 5:00P)
1	25-Aug	Yes	Intro Meeting	
2	1-Sep			Prepare for initial client meeting:
3	8-Sep	Yes	Case: Ch.1 (Team 1) Case: Ch.3 (Team 2)	Introductory meeting between Teams & Clients
4	15-Sep			Initial Specifications: Meet with coach
5	22-Sep	Yes	Case: Ch. 4 (Team 3) SFR Presentation	
6	29-Sep			PDR Readiness Review (draft) Meet with coach
7	6-Oct			PDR Readiness Review (record)
8	13-Oct		Fall Break	
9	20-Oct	Yes	PDR Dress Rehearsal Presentations	
10	27-Oct			PDR Presentation with Client
11	3-Nov			Preliminary Design Review + Exit Approval
12	10-Nov		Veterans Day	
13	17-Nov		Case: Ch. 5 (Team 4)	CDR plan Meet Coach: Finalize prototype, progress plan finalize system
14	24-Nov		Thanksgiving	
15	1-Dec			
Finals Week				

(Projected) Spring 20241

Week	Friday	In Class	Activity	Deliverable (5:00p Friday)
1	12-Jan			Project update with coach Schedule progress review meeting with clients Confirm CDR Plan with coach
2	19-Jan	Yes	B Review Case: Ch. 6.1 (Team 5) Case: Ch. 6.2 (Team 6)	Detailed Design meeting with client
3	26-Jan			
4	2-Feb	Yes	CDR Dress Rehearsal	
5	9-Feb			CDR update to coach
6	16-Feb			CDR Presentation & Report to client
7	23-Feb	Yes	Case: Ch. 7 (Team 7) Case: Ch. 8 (Team 8) Case: Ch. 9 (Team 9)	CDR Exit documents approved
8	1-Mar			TRR Review with Coach
9	8-Mar			TRR to client
Spring	15-Mar		Recess	
10	22-Mar			
11	29-Mar			
12	5-Apr			SVR review with Coach
13	12-Apr			
14	19-Apr	Yes		SVR & Final Report Customer Acceptance
15	26-Apr			Final Report (revised)
Finals	May 3			

- You must submit a completed and approved Final Report to receive a passing grade for the **ISE 495abx series**.

Textbook Errata Sheet:

Page 38 – Table 4.2 Requirements Hierarchy

Headings should read:

Customer Requirements	Functional Requirements What the system will do	Non -Functional Requirements How the system works
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Statement on Academic Conduct and Support Systems

Academic Conduct:

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, “Behavior Violating University Standards” policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on [Research and Scholarship Misconduct](#).

Students and Disability Accommodations:

USC welcomes students with disabilities into all of the University’s educational programs. The Office of Student Accessibility Services (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at osas.usc.edu. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu.

Support Systems:

Counseling and Mental Health - (213) 740-9355 – 24/7 on call
studenthealth.usc.edu/counseling

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call
suicidepreventionlifeline.org

Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL), press “0” after hours – 24/7 on call
studenthealth.usc.edu/sexual-assault

Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office for Equity, Equal Opportunity, and Title IX (EEO-TIX) - (213) 740-5086
eotix.usc.edu

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298
usc-advocate.symplicity.com/care_report

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

The Office of Student Accessibility Services (OSAS) - (213) 740-0776
osas.usc.edu

OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

USC Campus Support and Intervention - (213) 821-4710

campussupport.usc.edu

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity, Equity and Inclusion - (213) 740-2101

diversity.usc.edu

Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call

dps.usc.edu, emergency.usc.edu

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call

dps.usc.edu

Non-emergency assistance or information.

Office of the Ombuds - (213) 821-9556 (UPC) / (323-442-0382 (HSC)

ombuds.usc.edu

A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

Occupational Therapy Faculty Practice - (323) 442-3340 or otfp@med.usc.edu

chan.usc.edu/otfp

Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.