

IE 1090: Senior Design Capstone Course

Spring 2022

Course Syllabus

General Information

Meeting Dates and Times: 01/10/22 – 04/22/22

Fridays
9:00 AM – 11:55 AM

Please note: The documented meeting time for this course is from 9:00 AM – 11:55 AM on Fridays. However, the class will only meet during this time on specific dates throughout the semester. Please see the Course Schedule for details.

Location: 227 Benedum Hall

Canvas: <https://canvas.pitt.edu/courses/138257>

Text: Not Applicable

Instructor /Course Coordinator: Mike Sherwin, PhD, PE

- LinkedIn: www.linkedin.com/in/mdsherwin
- Web: <https://www.mdsherwin.com/>
- Email: mdsherwin@pitt.edu
- Phone: 412-554-0571 [cell]

Mentor: To be assigned

Units: 4.00

Office Hours:

Instructor

- Tuesdays: 1:00 PM – 3:00 PM
- Thursdays: 1:00 PM – 3:00 PM
- Fridays: 9:00 AM – 11:00 AM
- Please make an appointment via Calendly: <https://calendly.com/mdsherwin/15min>
- If you cannot find a mutually agreeable time to meet, please email me

Course Overview

Welcome to IE1090, the Senior Design Capstone Course. This is an unstructured course with specific objectives. Student project teams will be assigned to a project defined by a client organization. The project will be defined by a real industry problem. During the semester, students will apply Industrial Engineering qualitative and quantitative methods to propose solutions to the problem.

Responsibilities

Students and Student Teams

1. Students are assigned to project teams. The ideal size for a project team is 3-6 team members.
2. Teams will work in a professional manner with a client from a sponsor company.
3. Students shall set up a weekly (or mutually agreed upon) recurring meeting with their mentor and client. These meetings, most likely, will be held separately.
4. Students shall submit a weekly status report to the mentor, course coordinator, and client via email in advance of the scheduled recurring meeting. A recommended outline for the weekly status report is provided as a suggestion.
5. Students are responsible for meeting the needs of the client and their respective team members as it applies to the successful completion of their respective project.
6. Student teams shall utilize appropriate Industrial Engineering methods in completing their respective projects with a specific emphasis on analytics, modeling, system design, and quantifying measurable results.
7. Students are responsible for identifying risks/barriers and communicating those risks/barriers with a proposed solution to the mentor (first) and/or the course coordinator (as applicable). These risks/barriers may also include issues related to team dynamics. Early identification of risks/barriers is critical to project success.
8. Students are responsible for communications with their respective mentor and keeping the mentor informed in a timely manner. In addition, students shall heed the advice of their mentor when advice is provided.
9. Students shall identify roles for each team member within their respective team. At a minimum, a Project Manager (team lead) shall be named. Additional roles on the team are recommended to be assigned based on the work streams for the project as well as specific points of contact for administrative activities.
10. Students submit a project proposal to the client contact and mentor for approval.
 - a. The approved project proposal shall be submitted via Canvas.
 - b. It is recommended that students use a Six Sigma-type Project Charter for their respective proposals. However, this does not imply that their project is a "Six Sigma project".
11. Students shall establish a project plan that is kept up to date throughout the semester. At various points throughout the semester, students will submit updated action plans via Canvas.
12. Students are expected to spend at least 10-hours per week (each) on the project.
13. Students are responsible for submitting a formal report and an oral presentation to both representatives of the University of Pittsburgh and the client company at the conclusion of the course.
14. Students are responsible for always acting professionally. If students are unsure of professional conduct, they should consult with the mentor and/or course coordinator.

Instructor/Course Coordinator

1. Overall, the instructor/course coordinator is responsible for ensuring that the course is carried out in a manner that provides a positive learning experience for the students and delivers the most meaningful results possible for the client.
2. The instructor/course coordinator is responsible for the following activities. Please note that the exact role of the course coordinator with respect to the mentor may vary from project to project depending on need.
 - a. Facilitate the conduct of the course.
 - b. Deliver lectures as scheduled.
 - c. Coordinate and assign grades for the course.
 - d. Form project teams.
 - e. Assign projects to project teams.
 - f. Serve as a liaison with the client companies.
 - g. Mentor the team as needed and upon the request of the mentor.

Mentor

1. Mentors may be faculty members or members of outside organizations (i.e., Catalyst Connection).
2. Overall, the mentor is responsible for working with the student team as well as the course coordinator to ensure that the project is carried out in a manner that provides a positive learning experience for the students and delivers the most meaningful results possible for the client.
3. The mentor is responsible for the following activities. Please note that the exact role of the instructor/course coordinator with respect to the mentor may vary from project to project depending on need.
 - a. Meet with the respective student team on a weekly basis or on a frequency mutually agreed upon between the student team, mentor, and course coordinator.
 - b. Make themselves available, as appropriate, for client meetings.
 - c. Encourage and guide students in the use of appropriate Industrial Engineering methods with a specific emphasis on analytics, modeling, system design, and quantifying measurable results.
 - d. Provide input on grading to the course coordinator for their respective project team.
 - e. Approve the project proposal.
 - f. Hold students accountable when they begin to deviate from expectations.
 - g. Actively mentor the team as needed in project management, Industrial Engineering concepts, team dynamics, and in assisting the students in fulfilling their respective responsibilities.
 - h. Direct the student team to other faculty for support on their respective project when appropriate.
 - i. Coordinate with the course coordinator and client company on issues that may arise as appropriate.
4. Complete feedback surveys (mentor reviews) in a timely manner. The feedback collected will be used as part of the student's overall course grade (see Grading for details).

Client Contact

1. The role of the client contact in this course is to help students gain access to information, people, or other resources needed to complete the project successfully.
2. In addition to the client contact, it is expected that other members of the client company participate and provide input to the project as needed.
3. The client contact (or delegate) is responsible for the following activities.
 - a. Approve the project proposal.
 - b. Recommend timing and frequency of regular meetings with the project team.
 - c. Attend regular meetings with the project team.
 - d. Serve as a point of contact for project team visits to the facility.
 - e. Monitor the progress of the project.
 - f. Remove barriers within the company.
 - g. Review work in progress.
 - h. Verify and validate final recommendations.
 - i. Provide timely, accurate, and thorough responses to questions.
4. Complete feedback surveys (client reviews) in a timely manner. The feedback collected will be used as part of the student's overall course grade (see Grading for details).

Course Objectives

- Prepare students for engineering practice through a curriculum culminating major design experience that includes most of the following considerations: economic; sustainability; ethical; social; environmental; manufacturability; health and safety; and political.
- Provide students an opportunity to apply both qualitative and quantitative analytical investigative techniques for industry-related problems within organizations.

Learning Objectives

- Apply knowledge and skills acquired in earlier coursework to engineering practice.
- Apply engineering standards and tools within realistic constraints through a major design experience.
- Develop leadership, teamwork, systems thinking, problem solving, and project management skills within a project framework.
- Develop technical communication, presentation, and writing skills via interim presentations and a final written report.

Pre-Requisites

1. IE1035 – Engineering Management or
2. IE1080 – Supply Chain Analysis or
3. IE1083 – Simulation Modeling

Grading

Grading will be based on your achievements, both written and oral, on the project in terms of your negotiated project goals (from project definition), and your ability to work within a team structure. Input from the client contact, mentor, course coordinator, and your teammates will be used in determining the grade for the project. Students who do not participate fully with their groups will receive a lower grade. Table 1 provides a generalized framework for the grading rubric.

Table 1. Framework for grading rubric.

Criteria	Source	Type	Contribution
Project goals fully met as acknowledge by the client	Client Reviews	Group	20%
Demonstrated contribution to the team as a team member	Mentor and Peer Reviews	Individual	20%
Presenting and communicating to a variety of audiences	Presentations and Final Report	Group	20%
Identifying, implementing, and demonstration knowledge of IE methods	Mentor Reviews	Group	10%
Working independently, proactively, and creatively as a team	Mentor and Client Reviews	Group	10%
Demonstration of good project management and organization	Mentor and Client Reviews	Group	10%
Completing activities per the Course Schedule in a timely fashion	Course Coordinator	Individual and Group	10%

Course Schedule, Actions, Lectures, and Deliverables

The course will follow the schedule listed below (subject to change). Please note that if something specific is not due or required in a given week, the expectation is for student teams to be continuously working toward completion of the project, conducting team meetings, and conducting recurring meetings with the client and mentor.

Key: Responsibilities

- | | | |
|-------------------------------------|--------------------|--------------|
| ● I – Instructor/Course Coordinator | ● T – Student Team | ● M – Mentor |
| ● S – Student | ● C – Client | ● G – Guests |

Types

- **Action** – Item requires completion per course requirements
- **Milestone** – Description of status to keep project on track; may be completed earlier than date noted
- **Canvas** – Item needs submitted to Canvas (one submission per Student Team)
- **Presentation** – Presentations delivered by students during time specified
- **Lecture** – Class meeting during specified time

Due	Time	Type	Description	Responsible
Week 1: 01/10/22 – 01/16/22				
01/10/22		Action	Pre-course survey distributed	I
01/12/22	11:59 PM	Action	Complete pre-course surveys	S
01/14/22		Action	Teams formed and projects assigned to teams	I
01/14/22	9:00 AM – 10:30 AM	Lecture	Kick-off	I, S
Week 2: 01/17/22 – 01/23/22				
01/21/22		Action	Team roles established	T
01/21/22		Action	Initial contact made with client – problem defined	T
01/21/22		Action	Recurring meetings set on calendars	T
01/21/22		Action	First recurring meetings held [1]	T
01/21/22	9:00 AM – 10:30 AM	Lecture	Project Management Tools and Organization	I, S
Week 3: 01/24/22 – 01/30/22				
01/26/22		Action	Project proposal drafted	T
01/28/22	11:59 PM	Canvas	Submit updated action plan (Action Plan #1) to Canvas	T
01/28/22	11:59 PM	Action	First weekly status report submitted [1]	T
01/28/22		Action	Project plan established [2]	T
01/28/22	9:00 AM – 10:30 AM	Lecture	Project Leadership and Teamwork	I, S
Week 4: 01/31/22 – 02/06/22				
02/02/22	11:59 PM	Action	Project proposal submitted for approval	T, C, M
02/04/22	11:59 PM	Canvas	Submit approved project proposal to Canvas	T
02/04/22	9:00 AM – 10:30 AM	Lecture	Project Communication	I, S

Note: Red Text Indicates Revisions Made to the Previously Published Revision of the Syllabus

Due	Time	Type	Description	Responsible
Week 5: 02/07/22 – 02/13/22				
02/09/22		Milestone	Select solution paths	T
02/10/22	11:59 PM	Canvas	Submit Presentation #1 to Canvas	T
02/11/22	9:00 AM – 11:55 AM	Presentation	Present Presentation #1	T
Week 6: 02/14/22 – 02/20/22				
No specific actions or deliverables this week. Keep up the momentum of the project!				
Week 7: 02/21/22 – 02/27/22				
02/21/22		Action	Distribute Mid-Term Peer Evaluation (MTPE)	I
02/23/22	11:59 PM	Action	Complete MTPE	S
02/25/22		Action	Provide MTPE feedback where applicable	I, M
Week 8: 02/28/22 – 03/06/22				
02/28/22		Milestone	Data gathering should be complete	T
Week 9: 03/07/22 – 03/13/22				
Spring Break – No Deliverables				
Week 10: 03/14/22 – 03/20/22				
03/18/22	11:59 PM	Canvas	Submit updated action plan (Action Plan #2) to Canvas	T
03/18/22		Milestone	Data analysis should be complete	T
Week 11: 03/21/22 – 03/27/22				
03/24/22	11:59 PM	Canvas	Submit Presentation #2 to Canvas	T
03/25/22	9:00 AM – 11:55 AM	Presentation	Present Presentation #2	T
Week 12: 03/28/22 – 04/03/22				
03/28/22		Action	Distribute Individual Reflection	I
03/30/22	11:59 PM	Action	Complete Individual Reflection	S
04/01/22	11:59 PM	Canvas	Submit updated action plan (Action Plan #3) to Canvas	T
04/01/22		Milestone	Recommendations should be complete	T
Week 13: 04/04/22 – 04/10/22				
04/04/22		Action	Distribute Final Peer Evaluation	I
04/08/22	11:59 PM	Action	Provide list of invitees for Final Presentation	S
04/08/22	11:59 PM	Action	Complete Final Peer Evaluation	S
04/08/22		Milestone	Draft Final Presentation should be nearing completion	T
04/08/22		Milestone	Draft Final Report should be nearing completion	T
04/08/22		Milestone	Design EXPO Materials should be nearing completion	T

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Due	Time	Type	Description	Responsible
Week 14: 04/11/22 – 04/17/22				
04/12/22	1:00 PM – 1:50 PM	Action	Present at IE Undergrad Seminar (157 Benedum)	T
04/14/22	11:59 PM	Canvas	Submit Final Presentation to Canvas	T
04/14/22	11:59 PM	Action	Submit Final Report to Client via email • Cc: Instructor/Course Coordinator	T
04/14/22	11:59 PM	Canvas	Submit Final Report to Canvas	T
04/15/22	9:00 AM – 11:55 AM	Presentation	Present Final Presentation	T, I, M, C, G
Week 15: 04/18/22 – 04/24/22				
04/19/22	11:59 PM	Canvas	Submit Design EXPO Materials to Canvas	T
04/21/22	5:00 PM – 8:30 PM	Action	Design EXPO	T, I, M, C, G
04/22/22	11:59 PM	Action	Complete End of Year Survey (separate from OMET survey)	S
04/22/22	11:59 PM	Action	Submit all project files to Class OneDrive Directory	T
04/22/22	11:59 PM	Action	Deadline for presenting to Client • Independently coordinated between Team/Client • May be completed prior to 04/22/22	T

Notes: [1] Recurring hereafter
[2] Maintain status ongoing

Academic Integrity

All students and faculty are expected to adhere to the standards of professional conduct and academic honesty. Any student engaged in cheating, plagiarism, or other acts of academic dishonesty would be subject to disciplinary action. Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the SSOE Academic Integrity Policy found at: <https://www.engineering.pitt.edu/Academic-Integrity-Guidelines/>.

Disability Services

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and Disability Resources and Services (DRS), 140 William Pitt Union, (412) 648-7890, drsrecep@pitt.edu, (412) 228-5347 for P3 ASL users, as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course. <https://www.diversity.pitt.edu/disability-access/disability-resources-and-services>.

Statement on Classroom Recording

To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student's own private use.

Student Opinion of Teaching Surveys

Students in this class will be asked to complete a *Student Opinion of Teaching Survey*. Surveys will be sent via Pitt email and appear on your Canvas landing page during the last three weeks of class meeting days. Your responses are anonymous. Please take time to thoughtfully respond, your feedback is important to me. Visit the University Center for Teaching and Learning website to learn more about *Student Opinion of Teaching Surveys*.

Religious Observance

The observance of religious holidays (activities observed by a religious group of which a student is a member) and cultural practices are an important reflection of diversity. As your instructor, I am committed to providing equivalent educational opportunities to students of all belief systems. At the beginning of the semester, you should review the course requirements to identify foreseeable conflicts with assignments, exams, or other required attendance. If possible, please contact me within the first two weeks of the semester to allow time for us to discuss and make fair and reasonable adjustments to the schedule and/or tasks.

Diversity and Inclusion

The University of Pittsburgh does not tolerate any form of discrimination, harassment, or retaliation based on disability, race, color, religion, national origin, ancestry, genetic information, marital status, familial status, sex, age, sexual orientation, veteran status or gender identity or other factors as stated in the University's Title IX policy. The University is committed to taking prompt action to end a hostile environment that interferes with the University's mission. For more information about policies, procedures, and practices, see: <https://www.diversity.pitt.edu/>.

I ask that everyone in the class strive to help ensure that other members of this class can learn in a supportive and respectful environment. If there are instances of these issues listed above, please contact the Title IX Coordinator by calling 412-648-7860 or emailing titleixcoordinator@pitt.edu. Reports can also be filed online: <https://www.diversity.pitt.edu/civil-rights-title-ix/make-report/report-form>. You may also choose to report this to a faculty/staff member; they are required to communicate this to the University's Office of Diversity and Inclusion. If you wish to maintain complete confidentiality, you may also contact the University Counseling Center (412-648-7930).

COVID-19 Statement

During this pandemic, it is extremely important that you abide by public health regulations and University of Pittsburgh health standards and guidelines. While in class, at a minimum, you must wear a face covering that covers your nose and mouth; other requirements may be added by the University during the semester. These rules have been developed to protect the health and safety of all community members. Failure to comply with these requirements will result in you not being permitted to attend class in person and could result in a Student Conduct violation. For the most up-to-date information and guidance, please visit coronavirus.pitt.edu and check your Pitt email for updates before each class.

Communication to Instructor Pertaining to Illness

As in any situation regarding class absence (remote or in person), a student who becomes ill (albeit COVID-19 related or not) is responsible for communicating with me regarding course absences. Please contact me and provide documentation when absences affect quizzes/exams. This should be done via email as soon as possible.

Seating Chart Statement

For those individuals who will be attending the class in person, I will be using a seating chart. Please be considerate and continue to sit in your designated seat through the term. If you wish to move to a different location, please let me know and I will do my best to accommodate your request.

Recorded Lectures

I will notify the class at the time of recording that a particular lecture is being recorded. Students who do not wish to be heard in the recording should refrain from speaking or asking questions during the class session that is being recorded. Please know that PA is a two-party wire tap state. If students do not wish to be recorded, but have questions regarding class material, then said student should engage the professor immediately after class to have their questions addressed, or attend the next office hour.

ABET Criteria 3. Student Outcomes

The program must have documented student outcomes that support the program educational objectives. Attainment of these outcomes prepares graduates to enter the professional practice of engineering. Student outcomes are outcomes (1) through (7), plus any additional outcomes that may be articulated by the program.

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

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
4. an ability to 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
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.