New Jersey Institute of Technology
Department of Engineering Technology
ET 450 Multidisciplinary Capstone Project

COURSE NUMBER	ET 450
COURSE NAME	Multidisciplinary Capstone Project
COURSE STRUCTURE	2-2-3 (lecture hr/wk - lab hr/wk – course credits)
COURSE COORDINATOR/ INSTRUCTOR	Dr. S. Lieber/ J. Beshay
COURSE DESCRIPTION	This course allows engineering technology students from multiple disciplines to apply principles learned in all technical courses to a capstone project. Projects can be multidisciplinary or discipline specific and are developed by an individual or by small groups. The project must meet the requirements of the student's engineering technology program and course instructor. A formal written report and oral presentation and are required.
PREREQUISITE(S)	
COREQUISITE(S)	
RESTRICTIONS	Senior standing and department approval.
REQUIRED, ELECTIVE OR SELECTED ELECTIVE	Required
PROVIDED MATERIALS	**NJIT Library:** • Engineering Design: A Project-Based Introduction (ISBN 978-1-119-63541-3) by Elizabeth J. Orwin.
COMPUTER USAGE	Microsoft Office, Visio, MS-Project, CAD, Discipline Specific Software, Linked-In Learning.

COURSE LEARNING OUTCOMES (CO)	By the end of the course students should be able to: 1. Prepare detailed schedules and cost analysis using software for graphical communication. 2. Organize project review meetings and submit project management documentation. 3. Provide references for research material that increased their technical knowledge as required for their project. 4. Develop a detailed capstone project in technical report format. 5. Perform an analysis of their capstone project. 6. Provide a written report and give an oral presentation of their proposed capstone project. 7. Develop an awareness of professional ethics, diversity equity and inclusion, and career development.
CLASS TOPICS	Project Design and Analysis, Project Management Documentation, Project Log Book, Design Review, Project Planning, Project Cost Estimating, Design Project Reports and Presentations, Professional Ethics, Diversity Equity and Inclusion, Career Planning, Research and Development
STUDENT OUTCOMES	The Course Outcomes support the achievement of the following ABET-ETAC Student Outcomes: **Student Outcome (2)** - an ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline. **Related CO – 4, 5** **Student Outcome (3)** - an ability to apply written, oral, and graphical communication in broadly-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature. **Related CO – 1, 3, 4, 6** **Student Outcome (4) -** an ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes;

	Related CO 4, 5 **Student Outcome (5)** - an ability to function effectively as a member as well as a leader on technical teams. **Related CO - 2**
ACADEMIC INTEGRITY	NJIT has a zero-tolerance policy regarding cheating of any kind and student behavior that is disruptive to a learning environment. Any incidents will be immediately reported to the Dean of Students. In the cases the Honor Code violations are detected, the punishments range from a minimum of failure in the course plus disciplinary probation up to expulsion from NJIT with notations on students' permanent record. Avoid situations where honorable behavior could be misinterpreted. For more information on the honor code, go to http://www.njit.edu/academics/honorcode.php
STUDENT BEHAVIOR	See Individual Instructor Policies, which can include: • No eating or drinking is allowed at the lectures, recitations, workshops, and laboratories. • Cellular phones must be turned off during the class hours – if you are expecting an emergency call, leave it on vibrate. • No headphones can be worn in class. • Unless the professor allows the use during lecture, laptops should be closed during lecture.
MODIFICATION TO COURSE	The Course Outline may be modified at the discretion of the instructor or in the event of extenuating circumstances. Students will be notified in class of any changes to the Course outline.
CLASS HOURS & LOCATION	Friday (6-10:05 PM) CKB 106
PREPARED BY	Joseph Beshay
COURSE COORDINATED BY	Samuel C. Lieber

OFFICE HOURS:

By appointment: joseph.beshay@njit.edu

Grading Legend

GRADE	NUMERIC RANGE
A	90 to 100
B+	85 to 89
B	80 to 84
C+	75 to 79
C	70 to 74
D	60 to 69
F	0 to 59

GENERATIVE AI

Student use of artificial intelligence (AI) is permitted in this course for certain assignments and activities. It is not permitted to be used in the assignments noted by the instructor, as doing so would undermine student learning and achievement of course learning outcomes. Additionally, if and when students use AI in this course, the AI must be cited as is shown within the NJIT Library AI citation page for AI. If you have any questions or concerns about AI technology use in this class, please reach out to your instructor prior to submitting any assignments.

NJIT ONLINE INFORMATION

The instructor will discuss these requirements on the first day of the course and/or post on their Learning Management System (LMS). Please become familiar

GRADING:

Deliverable	Percentage of Grade
Project Log Book	15%
Project Progress Reports	
Meeting Minutes	10%
Design Project Proposal Oral Presentation	5%
Design Project Proposal	10%
Design Project Oral Presentation	10%
Design Project Report	35%
Career Development Project*	5%
Ethics and Professionalism Project*	5%
AI Assignment*	5%
*assignments need to be submitted to complete the course.	

COURSE RULES AND REGULATIONS:

1. Attendance in class is mandatory. If you must miss a class, notify the instructor by email before the class meeting. If that is not possible, due to extenuating circumstances, then notify the instructor by email immediately when possible. 2 or more unexcused absences will result in failure of the course.
2. All presentations must be done using Power Point or equivalent software.
3. All drawings must be done using CAD. Analysis software should be used whenever possible.
4. Assignments are not accepted late for any reason. If you must miss a class, please make arrangements to have someone hand in your assignment when due. The exception of course is if there is a family emergency. In such a situation, effort must be made to submit the work at the first possible time. Please note, email may be used to submit assignments in these instances

RECORD REQUIREMENTS

1. Project Log Book:

This is a daily project log. The logbook should include a record of anything having to do with your project, e.g., sketches, calculations, summaries of articles, conversations and/or meetings. The Project Log Book will be checked at Individual Meeting with instructor. It must be submitted with the final project report.

2. Team Project Progress Report (1-2 pages):

Progress Reports are due as indicated on syllabus. Follow provided template or specific request from instructor. General Progress reports should include the following:

1. Group Number and Project Title
2. Names of Group Members
3. Progress Period Start and End Date
4. Itemized summary of progress (i.e., productive activities) during the progress period.
5. Identify any problems encountered and fixes implemented.

6. List change orders processed during the progress period.
7. List activities planned for the next progress period.
8. Report status of project relative to your planned schedule. (Show schedule and any changes).

3. Design Review Meeting Minutes (1 page):
Please follow provided template. Minutes to a Design Review meeting should include the following:

1. Title of Topic of the Meeting
2. Location, Date and Time of the Meeting
3. Principle Presenter if appropriate
4. Names of Attendees
5. Summary of the Discussion during the meeting by person or group
6. Name and Signature of Person Recording the Minutes

4. Project Proposal (3 to 5 pages):
Please follow the provided template. The proposal will include the following:

1. Project Title
2. Name of Project Designers
3. Executive Summary
4. Concept –Brainstorming
5. Background -Problem Statement
6. Problem Definition
7. Design, Realization, and Analysis Planning
8. Project Phases & Planned Schedule
9. Planned Project Logistics & Budget

The Proposal will contain a draft of the above items for presentation.

5. Project Report (5 to 10 pages, excluding drawings):
Please follow the provided template. The report will include the following:

1. Project Title
2. Name of Project Designers
3. Executive Summary
4. Concept –Brainstorming
5. Background -Problem Statement
6. Problem Definition
7. Design, Realization, and Analysis Planning
8. Project Phases & Planned Schedule
9. Planned Project Logistics & Budget
10. Engineering Design & Analysis
11. Prototyping
12. Testing & Analysis
13. Actual Project Schedule
14. Actual Project Logistics & Budget
15. Discussion & Conclusion

DESIGN PROJECT REQUIREMENTS

1. The team or individual should select a project category they are personally interested in.
2. The project costs should be reasonably within your personal limits.
3. The necessary manufacturing resources should be obtainable by you.
4. The project will have an engineering design/analysis element to it.
5. The project may not have been already been started by you or someone else.
6. You must be the principle designer for this project. You may have assistance, but it must be under your personal direction.
7. Once a project is selected, it may not be changed.

COURSE OUTLINE:

Week	Date	TOPIC/ACTIVITY
1	9/5	**Lecture:** Introduction: Design Project Report/Presentation, Progress Reports, Meeting Minutes, Project Log Book. Formation of Teams, Selecting Project, Background on Project
		Lab: Resources for Making. Individual Discussion with Professor
2	9/12	**Lecture:** Design Statement, Objectives, Constraints & Concept Design How to use NJIT library resources to research. ***Deliverable Due*** : Progress Reports (Concept Brainstorming)
		Lab: Time to conduct research. Team Meetings & Discussion with Professor
3	9/19	**Lecture:** Design, Realization, and Analysis Planning ***Deliverable Due***: Progress Reports (Background-Problem Statement)

Week	Date	TOPIC/ACTIVITY
		Lab: Time to conduct research. Team Meetings & Discussion with Professor
4	9/26	**Lab:** Project Planning, Time Scheduling, and Cost Estimating ***Deliverable Due***: Progress Reports (Problem Definition)
		Lab: Individual Design Review Meeting with Instructor, Minutes due 1 week after meeting
5	10/3	**Lab:** Converting Design Objectives and Constraint to Design Functions and Features ***Deliverable Due***: Progress Reports (Design, Realization, and Analysis Planning) and Minutes (Session 4)
		Lab: Teams meet on project phases, planned schedule, logistics, and budget
6	10/10	**Lab:** Project Design: Design for Prototyping. ***Deliverable Due***: Progress Reports (project phases, planned schedule, logistics, and budget)
		Lab: Teams work on Project Proposal.

Week	Date	TOPIC/ACTIVITY
7	10/17	**Lecture:** ***Deliverable Due*** Design Project Proposal Design Project Proposal Presentation
8	10/24	**Lecture:** Concept Development & Prototyping
		Lab: Individual Design Review Meeting with Instructor, Minutes due 1 week after meeting
9	10/31	**Lecture:** Career Development, Professionalism & Engineering Ethics ***Deliverable Due*** : General Progress Reports and Minutes (Week 8)
		Lab: Concept Development & Prototyping
10	11/7	**Lecture:** Engineering Design & Analysis Part 1
		Lab: Concept Development & Prototyping Individual Design Review Meeting with Instructor, Minutes due 1 week after meeting
11	11/14	**Lecture:** Team work on projects. ***Deliverable Due*** : General Progress Report and Minutes (Week 10)
12	11/21	Project time.

Week	Date	TOPIC/ACTIVITY
NO CLASS 11/26 FRIDAY SCHEDULE		
13	11/26 (Wed.)	**Lecture:** Individual Meeting with Instructor
		Lab: Project Time Design Project Presentations
14	12/3	**Lecture:** ***Deliverable Due*** Design Project Report Design Project Presentations Career Project