New Jersey Institute of Technology
Department of Engineering Technology
MET 450 Mechanical Design Project

COURSE NUMBER	MET 450
COURSE NAME	Mechanical Design Project
COURSE STRUCTURE	2-2-3 (lecture hr/wk - lab hr/wk – course credits)
COURSE COORDINATOR/ INSTRUCTOR	Dr. J Sodhi/ Prof. Joseph Beshay
COURSE DESCRIPTION	The course applies the principles learned in all technical courses to more advanced design situations. Project of a typical mechanical engineering system is developed and presented by an individual or by small groups. The project must meet the approval of course instructor. A formal report is required. Oral presentation and formal written report are required.
PREREQUISITE(S)	MET 303, MET 304, MET 314, ECET 329, COM 312 or COM 313.
COREQUISITE(S)	MET 302
REQUIRED, ELECTIVE OR SELECTED ELECTIVE	Required
REQUIRED MATERIALS	None.
COMPUTER USAGE	Microsoft Office, Visio, MS Project, CAD
COURSE LEARNING OUTCOMES (CO)	By the end of the course students should be able to: 1. Design a system, component or process that meet specified needs.

	2. Analyze and evaluate the mechanical performance of their design.
	3. Develop detailed project schedules that address technical team roles and resources.
	4. Organize design review meetings and develop meeting minutes.
	5. Produce a prototype of the design and verify that it meets the specifications.
	6. Organize credible sources that enhance technical project knowledge and cite in written and oral communication.
	7. Develop a comprehensive technical report detailing the design project.
	8. Describe the project at various stages through oral and graphical communication.
	9. Define and explain the role of professional ethics and relevant regulatory bodies in engineering practice.
	10. Function effectively as a member as well as a leader of a technical team.
CLASS TOPICS	Project Report, Meeting Minutes, Project Log Book, Design Project Report Organization, Project Design and Analysis, Three Individual Design Review Meetings with Instructor, Three Group Design Review Meetings, Presentation of Project Reports, Project Time Scheduling, Project Planning Overview Presentation, Project Cost Estimating, Professional Ethics, Design Project Presentations
STUDENT OUTCOMES	The Course Outcomes support the achievement of the following MET Student Outcomes: **Student Outcome (1) -** an ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly-defined engineering problems appropriate to the discipline **Related CO – 1, 2, 3, 5 thru 9** **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 – 1, 2, 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 – 4, 6, 7 and 8** **Student Outcome (4) -** an ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes; **Related CO – 2, 5 and 7** **Student Outcome (5)** - an ability to function effectively as a member as well as a leader on technical teams. **Related CO – 3, 4 and 10**
ACADEMIC INTEGRITY	Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: NJIT Academic Integrity Code. Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu.
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.
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.
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	Thursdays 6:00 pm - 10:05pm, CKB 303
PREPARED BY	Prof. Joseph Beshay/ Dr. J. Sodhi
COURSE COORDINATED BY	Dr. J. Sodhi

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

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

- Canvas: https://canvas.njit.edu/
- Zoom: https://njit-edu.zoom.us/
- Online Proctoring: https://ist.njit.edu/online-course-exam-proctoring

GRADING:

Deliverable	Percentage of Grade
Project Log Book/Project Progress Reports	15%
Prompt Engineering AI Assignment	5%
Meeting Minutes	10%
Design Project Proposal Oral Presentation	5%
Design Project Proposal	10%
Design Project Oral Presentation	15%
Design Project Report	30%
Career Development Project	5%
Professionalism and Ethics	5%

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.
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. Entries should be recorded in ink, dated and signed. 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 – Clear explanation of concept and description including preliminary sketches.
5. Background Information on Project Selection
6. Design Criteria
7. Concept Design
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 – Clear explanation of concept and description including preliminary sketches.
5. Background Information on Project Selection
6. Design Criteria
7. Concept Design
8. Project Phases & Planned Schedule
9. Planned Project Logistics & Budget
10. Engineering Design & Analysis
11. Prototyping
12. Testing & Analysis
13. Business Plan
14. Actual Project Schedule
15. Actual Project Logistics & Budget
16. Discussion & Conclusion

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

DESIGN PROJECT REQUIREMENTS

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

COURSE OUTLINE:

WEEK	DATE	TOPIC/ACTIVITY
1	9/4	**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	9/11	**Lecture:** Design Criteria & Concept Design *Deliverable Due* : Progress Reports (Concept) **Lab:** Team Meetings & Discussion with Professor
3	9/18	**Lecture:** Project Design: Design for Prototyping. *Deliverable Due*: Progress Reports (Background & Design Criteria) **Lab:** Team Meetings & Discussion with Professor
4	9/25	**Lecture:** Project Planning, Time Scheduling, and Cost Estimating *Deliverable Due*: Progress Reports (Concept Design) **Lab:** Converting Design Criteria to Design Features Individual Design Review Meeting with Instructor, Minutes due 1 week after meeting

WEEK	DATE	TOPIC/ACTIVITY
5	10/9 (No Class on 10/2)	**Lecture:** Engineering Design & Analysis Part 1 *Deliverable Due*: Progress Reports (Plan & Budget) and Minutes (Week 4) **Lab:** Concept Development & Prototyping
6	10/16	**Lecture:** Engineering Design & Analysis Part 2 **Lab:** Concept Development & Prototyping
7	10/23	**Lecture:** *Deliverable Due* Design Project Proposal Design Project Proposal Presentation **Lab:** Concept Development & Prototyping
8	10/30	**Lecture:** Special Lecture: Marketing *Deliverable Due*: General Progress Reports **Lab:** Concept Development & Prototyping Individual Design Review Meeting with Instructor, Minutes due 1 week after meeting

WEEK	DATE	TOPIC/ACTIVITY
9	11/6	**Lecture:** Special Lecture: Intellectual Property *Deliverable Due* : General Progress Reports (focus on Engineering Design & Analysis) and Minutes (Week 8) **Lab:** Concept Development & Prototyping
10	11/13	**Lecture:** Career Development, Diversity Equity & Inclusion, & Engineering Ethics *Deliverable Due* : General Progress Reports (focus on Prototyping) **Lab:** Concept Development & Prototyping Individual Design Review Meeting with Instructor, Minutes due 1 week after meeting
11	11/20	**Lecture:** Project Business Plan *Deliverable Due* : Progress Reports (Testing & Analysis) and Minutes (Week 10) **Lab:** Concept Development & Prototyping
12	11/25 (Tues on Thurs Schedule)	**Lecture:** Special Lecture: Product Development *Deliverable Due*: Progress Reports (Business Plan) **Lab:** Prototyping & Testing
13	12/4	**Lecture:** Individual Meeting with Instructor

WEEK	DATE	TOPIC/ACTIVITY
		Lab: Design Project Time
14	**12/11**	**Lecture:** ***Deliverable Due*** Design Project Report Design Project Presentations Career Project