COURSE NUMBER	**ME 408**
COURSE TITLE	**Mechanical Systems Design II**
COURSE STRUCTURE	1-2-2 (lecture hr/wk – lab hr/wk – course credits)
COURSE COORDINATOR	R. Sodhi
COURSE DESCRIPTION	A continuation of ME 403 from a more integrated viewpoint, with lectures on special topics. Concepts in optimization and computer simulation are considered in the design and synthesis of mechanical engineering systems. The projects are more comprehensive, emphasizing creative design, and requiring design decisions of a more sophisticated nature.
PREREQUISITE(S)	ME 403 – Mechanical Systems Design I ME 407 – Heat Transfer
COREQUISITE(S)	None
REQUIRED MATERIALS	A Ertas and J.C. Jones, The Engineering Design Process, 2nd Edition, Wiley, 1996
REQUIRED, ELECTIVE OR SELECTED ELECTIVE	Required
Other supplemental materials (not req.)	D.Planchard and M.Planchard, Engineering Design with SolidWorks, SDC , 2012.
COMPUTER USAGE	Solid Modeling, Finite Element Simulation: Mechanical Stresses/Strains, Thermal/Fluid, Optimization. MS Word and MS PowerPoint

COURSE LEARNING OUTCOMES/ EXPECTED PERFORMANCE CRITERIA:

Course Learning Outcomes	SOs*	Expected Performance Criteria
1 **write** a design proposal incorporating evaluation of need, technical and economic feasibility and environmental impact	c,d,g,k	**Report** (80% of students will earn a grade of 75% or better on this submission)
2. **develop** a design notebook, accompanied by a list of critical design tasks and a scheduling time chart to be reviewed during bi-weekly consultations	c,d,e,f,g	**Report** (80% of students will earn a grade of 75% or better on this submission)
3. **write** monthly interim reports (drafts) documenting cumulative progress towards the final report	c,d,e,f,g	**Report** (80% of students will earn a grade of 75% or better on this submission)
4. **write** a comprehensive final project report illustrating principles of engineering science, simulations, optimization, analysis, model building	a,c,d,e,f,g	**Final Group Report** (80% of students will earn a grade of 75% or better on this submission)
5. **make** an oral presentation documenting the final report using visual aid software.	d,e,g,k	**Presentation** (80% of students will earn a grade of 75% or

			better on this presentation)
	6. **confirm** FEA simulation results using fundamental principles and structural theories	a,c,d,e,f,k	**Report** (80% of students will earn a grade of 75% or better on this submission)
	7. **build** prototypes, demonstration models and/or 3D copies associated with their projects with the assistance of the MIE department technical staff and the NJIT factory floor	b,d,e,g,k	**Demonstrate** (80% of students will earn a grade of 75% or better on this submission)
	8. **conduct** experiments and trials, when appropriate, to validate design choices simulations and analysis	a,b,d,e,g,k	**Report** (80% of students will earn a grade of 75% or better on this submission)

CLASS TOPICS

1. Introduction: review formats for design proposal, project report, interim reports, progress reports and design notebook
2. Submit design proposal. If necessary, resubmit with revisions. Establish design task definitions and time chart. Lecture: Health safety and environmental issues in engineering projects.
3. Submit weekly progress reports and design notebooks during bi-weekly team-instructor consultations.
4. Submit First Interim Report. Incorporate changes as suggested by instructor and continue design
5. Submit weekly progress reports and design notebooks during bi-weekly team-instructor meetings. Incorporate design changes and make use of appropriate technical consultants throughout the NJIT campus.
6. Submit Second Interim Report. Incorporate changes and continue design. Lecture: Confirmation of FEA results using simplified models from elementary theories.
7. Submit weekly progress reports and design notebooks during bi-weekly team-instructor consultations. Where appropriate, make arrangements with the MIE department staff or the NJIT factory floor for prototype building, demonstration model building and/or the use of the 3D printing apparatus.
8. Submit Third Interim Report. Incorporate changes as suggested and prepare for submission of the Final Report. Begin preparation for oral report presentation. Lecture: Oral communication methods and skills.
9. Final weekly progress report and review of design notebook. Further preparation for oral report and visual presentation.
10. Submit Final Report and design notebook. Make team oral presentation of the design project before a general NJIT audience composed of students, faculty, staff and guests.

STUDENT OUTCOMES (SCALE: 1-3)

a	b	c	d	e	f	g	h	i	j	k
3	2	3	3	3	3	3				2

3 – Strongly supported 2 – Supported 1 – Minimally supported

* Student Outcomes.