<table>
<tr><td>COURSE NUMBER: VM450</td><td>COURSE TITLE: Design and Manufacturing III</td></tr>
<tr><td>CREDIT: 4</td><td>PREREQUISITES: Vm350 and Vm360 and Vm395</td></tr>
<tr><td>TEXTBOOKS/REQUIRED MATERIAL:
George Dieter and Linda Schmidt, Engineering Design, 4th Ed., 2008, McGraw Hill.</td><td>PREPARED BY: Dr. Mian Li
DATE OF PREPARATION: July 1, 2012
DATE OF UC APPROVAL: Oct. 30, 2013</td></tr>
<tr><td>INSTRUCTOR(S): Dr. Mian Li, Dr. Vincent Chang, Dr. Chengbin Ma, Dr. Kwee Yan Teh</td><td>SCIENCE/DESIGN: n/a</td></tr>
<tr><td>CATALOG DESCRIPTION:
The educational goal of VM450 is to give each student a deep understanding of how to approach open ended challenges by process, and to learn how to innovate and apply the seemingly fragmented engineering knowledge acquired at JI to the design and manufacturing of real mechanical, mechatronic or electrical/computer systems.</td><td>COURSE TOPICS:
1. Course Overview
2. Capstone Design Project Description
3. The Design Process and IDEO Video
4. Developing Engineering Specifications and QFD
5. Invited Lecture: The Art of Presentation (Workshop)
6. Invited Lecture: Literature Survey (Workshop)
7. QFD/Overview of Design Review #1 and Dress Code
8. Design Review #1: Team Presentation and Report Capstone Judge Panel
9. Teamwork Workshop—Part I
10. Concept Generation and Selection
11. Material & Manufacturing Process Selection
12. Design Review #2: Team Presentation and Report Capstone Judge Panel
13. Teamwork Workshop—Part II/Midterm Evaluation
14. Invited Lecture: Product Design in Automobile
15. Financial & Reimbursement Seminar
16. Control and Mechatronics
17. Design for Manufacturability
18. Design Review #3: Final Design and Engineering Analysis
19. Invited Talk or Town - Hall Meeting
20. Design Review #4: Alpha Prototype Review
21. Final Oral Defense & Design Expo Capstone Judge</td></tr>
<tr><td colspan="2">COURSE STRUCTURE/SCHEDULE: Lecture: twice per week, 90 minutes each</td></tr>
<tr><td>COURSE OBJECTIVES [Course Outcomes in brackets]</td><td>The educational goal of the courses is to give each student an understanding of design principles and to teach the integration and application of engineering knowledge obtained at JI toward the design and manufacturing of mechanical, mechatronic, or electrical/computer systems. At the end of the course, students are expected to:
1. To solve an open - ended mechanical, mechatronic or electrical/computer engineering design problem including considerations of performance, cost, and societal issues. The problem must provide opportunities for creative design, fundamental analysis, and proof - of - concept prototyping. Each student team works on a project and everyone participates in project proposal development, reporting, and the design process. [1, 2, 4, 5, 6, 9]
2. To apply a design process appropriate to the engineering problem at hand, including unstructured creativity as part of a structured design problem. [3]
3. To generate and evaluate design concepts after gaining a sound understanding of the problem background and existing design concepts. [3, 4, 7, 8]
4. To identify a set of design variables and governing equations for the selected design concept that can be utilized to improve the design. [1, 7, 8]</td></tr>
<tr><td>COURSE OUTCOMES [Program Outcomes in brackets]</td><td>When this course is completed, you should be able to achieve the following:
1. Given a qualitative and open - ended "real - world" engineering design problem that is relevant to contemporary issues, suggest a solution based on quantitative analysis. [a, b, c, j]
2. Learn to work effectively in engineering teams to resolve conflict and meet specific engineering objectives established during the project. Learn to communicate effectively with peers, project sponsors, advisors, and/or mentors. [d, f, g]
3. Learn to consider unstructured creativity as a natural part of a structured design process, and to systematically generate concepts using methods such as brainstorming and decomposition. [g]</td></tr>
</table>

	4. Learn to make good assumptions and exercise sound judgment in solving open‐ended problems. [e] 5. Manage and plan large design projects using time management tools, and be able to handle uncertain and incomplete information effectively to meet project goals. 6. Learn to clearly request and exchange quantitative information, and to communicate project results, to audiences of varying levels of expertise. [g] 7. Learn patent and literature search methods, benchmarking, and other general forms of background independent learning. [i] 8. Integrate past course material to advance basic system concepts to a prototyping level, providing support for all design decisions by defensible engineering analysis and reasoning.[a, k] 9. Understand the potential impact of an engineering decision on human society. [c, f, h]
ASSESSMENT TOOLS [Course Outcomes in brackets]	• Design Reviews (4 x 10% each) (Team grade) 40% • Design Expo Presentation (Team grade) 10% • Final Prototype (Team grade) 10% • Final Report (Team grade) 10% • Lecture Attendance & Participation (Individual grade) 10% • Peer Evaluations (Individual grade) 10% • Section Instructor Evaluation (Individual grade) 10%