MTE 445 – Materials Engineering Design II
Spring Semester 2015

Catalog Data: MTE 445 – Materials Engineering Design II. 3 semester hours. Capstone design course. Students work in teams on design projects which involve evaluation of industrial based metallurgical or materials problems and emphasize societal impact. Implementation of design principles and the research plan developed in MTE 443. Interim and final design reviews with oral presentations and written reports. Final project presentation will be evaluated by the MTE faculty. Writing proficiency is required for a passing grade in this course.

Prerequisite(s): MTE 353, 362, 416, and 443

Co-requisite(s): None

Textbook(s):

Primary Reference Text(s):

Additional Reference(s) and Resource(s):
- NovaFlow@Solid: [http://novacast.se/products/novaflowsolid/](http://novacast.se/products/novaflowsolid/)
- Other references and resources will be provided throughout the semester.

Course Objectives:
Provide students with direct experience in:
1. Choosing, defining and finding cost-effective solutions to real world engineering problems in the field of materials.
2. Effectively synthesizing and utilizing knowledge gained in other engineering courses to solve technical problems.
3. Working in teams to complete time-bound projects.
4. Oral and written technical communication using modern presentation equipment and aids.
**Topics Covered:**
Capstone design project. Interim and final design reviews with oral and written reports.
1. Engineering design
2. Project planning and flow
3. Conceptual design
4. Material selection
5. Materials process design
6. Embodiment design
7. Detail design
8. Team behavior and tools
9. Information gathering
10. Quality, robust design, and optimization
11. Special lectures

**Course Requirements:**
- Projects will be conducted by teams consisting of 2 to 4 students, as assigned by the instructor. Teams will give short presentations on technical aspects of their projects, provide a report in written form, and defend the report(s) orally before fellow students and the instructor/faculty.
- These elements must be addressed during the course of a project: (i) problem definition; (ii) technical background information; (iii) preliminary design; (iv) design evaluation; (v) parametric design (including geometry, materials choices, fabrication issues, and economic analysis); (vi) implementation schedule; (vii) reporting (oral and written).
- Oral progress reports will be in the form of short oral presentations lasting 25 minutes per group with five minutes for discussion following each presentation. The time for the final presentation will be 30 minutes per group.
- **Writing proficiency is required for a passing grade in this course.** Written project reports will be collected periodically during the course. Most of the project reports will be group reports; however, at least two will be individual reports completed by each team member. Each report will be evaluated, either individually or for each group depending upon the type of report. At least one of the individual written reports will graded and returned by midterm.
- As this is a W-designated course, all students must demonstrate the ability to write coherent, logical, properly edited sentences with proper referencing. Reports must be written using the instructor supplied design project template.
- Projects incorporating critical aspects of engineering design shall be selected by the instructor or solicited from an industrial sponsor. Students will be required to conduct sufficient background research and information synthesis in their assigned problems to develop a comprehensive project plan and implementation schedule.

**Class Schedule:**
- Class formally meets once or twice per week. Students are responsible for establishing additional meeting times of at least six (6) hours per week with their team, the instructor, and industrial collaborators (as applicable) to conduct their capstone design project(s).

**Relationship of Course to Meeting Program Outcomes:**
- The course supports program outcomes (d), (e), (g), (h), (j), and (l) specified in Criterion 3 of EC 2007 which have been adopted by the program as outcomes.

**Contribution of Course to Meeting the Professional Component:**

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Mathematics and Basic Science: None
Engineering Topics: 3 semester hours or 100%
Significant Engineering Design Content: Yes
General Education (Academic Core): None
Other: None

Relation of Course to Program Objectives: The course supports program objectives 1, 2, 3.

Prepared by: Prof. Laurentiu Nastac
Date: January 6, 2015