MET 351: METALLURGICAL ENGINEERING DESIGN I

CATALOG DATA:

MET 351 – METALLURGICAL ENGINEERING DESIGN I; (2-0) Credits
Prerequisites: Junior standing or graduation within five semesters, MET 220, MET 232
This course is the first semester of a two-course sequence in Junior Metallurgical Engineering Design that consists of both lectures and design practice sessions. The following topics are covered: Introduction to engineering design. Compare the scientific method with the engineering design method. Define the concept of need as it pertains to the design process. Develop skills associated with the use of modern and classical sources of information. Lectures on modeling and simulation, statistical process control, brainstorming, teaming, the creative process, economic evaluation, materials selection processes interaction of materials, and materials processing topics are presented. Focus on the design process, and the design method. The development of interdisciplinary teams is a high priority.

TEXTBOOK:

Textbook: ENGINEERING DESIGN, A Materials and Processing Approach, George E. Dieter, McGraw-Hill Company, Third Edition, 2000. (not required)

INSTRUCTOR:

Dr. Stanley M. Howard, Open Office Hours

REQUIRED/ELECTIVE

MET 351 is required for all B.S. Metallurgical Engineering students

EXPECTATIONS:

The course focuses on the presentation of two hours per week of design lectures and on the development of Junior Mini Design Projects (JMDP) with vertical and horizontal integration of concepts from all areas of Metallurgical Engineering. The student is expected to put together the fundamental and applied knowledge acquired during the previous years of the engineering tenure. This means a comprehensive effort involving most of the components of real-world design projects. Specifically the student is expected to acquire a good working knowledge of:

- Principles of product and process design
- Problem solving skills
- Analysis skills on materials microstructure/property relationships
- Communication skills, both oral and written

COURSE OBJECTIVES:

The objectives of this course are to provide hands on practical experience on Metallurgical Engineering Design. Students develop their projects by working in interdisciplinary teams under the direction and supervision of one or more Faculty mentors. During the development of the course the students will demonstrate acquire skills to:

- Assessment of need
- Proposal preparation
- Definition of design requirements
- Gather information
- Conceptualize various solutions
- Evaluation of design concepts and select a candidate design
- Work in an interdisciplinary team environment
- Communicate the design effectively by written reports and oral presentations

CLASS SCHEDULE:

MET 351 classes will meet Mondays and Wednesdays 3:00-3:50 in MI 320. A final written and oral presentation is required.

TOPICS:

Orientation for the Design Sessions, Presentation and Discussion of the Design Program, Design Process and Projects, Literature Search , Brainstorming, Design of Experiments, Ethics, Creative Process, Process Analysis I, Junior Mini Design Projects.

COMPUTER USAGE:
As required by lectures and projects

COURSE OUTCOMES:
During this course students will demonstrate the ability to:

- Define the problem and establish the project specifications and constrains
- Gather information and establish the state of the art on the design science and technology
- Conceptualize various concept solutions to the design problem
- Use decision matrices for the selection of the candidate solution
- Establish the candidate design and the matrix of tasks needed to achieve this design
- Establish a project schedule
- Work effectively in a team environment
- Write progress and final design reports
- Make effective oral presentations

RELATION OF COURSE OUTCOMES TO PROGRAM OUTCOMES: (d), (e), (f), (g)

LABORATORY:
As required by projects

PREPARED BY:
Dr. Stanley M. Howard, September 1, 2009