Department of Materials Science and Engineering
University of Maryland, College Park, Maryland

1. **ENMA 484 – Fundamentals of Finite Element Modeling**

2. **Credits and contact hours – 3 credits.** The University of Maryland follows the Maryland Higher Education Commission's policies on "contact hours;" specifically, one semester hour of credit will be awarded for a minimum of 15 hours, of 50 minutes each of actual class time, exclusive of registration, study days, and holidays.

   Schedule: meets two 75 minute periods per week

3. **Instructor's or course coordinator's name: Prof. Rama Ankem**

4. **Text book, title, author and year:** Saeed Moaveni; Title: Finite Element Analysis: Theory and Application with ANSYS, 4th Edition; Publisher: Pearson; ISBN-13: 978-0-13-384080-3

5. **Specific course information**
   a. **Brief description of the content of the course (catalog description):** A brief review of mechanical behavior of materials, introduction to Finite Element Modeling (FEM), and procedures for predicting mechanical behavior of materials by FEM using computer software (at present ANSYS). The FEM procedures include, setting up the model, mesh generation, data input and interpretation of the results.
   b. **Pre-requisites or co-requisites:** Permission of ENGR-Materials Science & Engineering department.
   c. **Indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program:** ENMA 484 is an elective course for Materials Science and Engineering majors.

6. **Specific goals for the course:**
   a. **Specific outcomes of instruction:** The main objectives of this course are to:
      1. Understand how the finite element method works and learn how to set up a FEM model to solve a problem.
      2. Learn how to validate the FEM model using conventional solution techniques.
      3. Solve various problems by using commercial FEM software (such as ANSYS) to predict mechanical behavior of various materials and structures.
      4. Learn how to interpret the FEM results and present them in an organized and useful fashion.

b. Explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed in this course.

ABET A: Ability to apply mathematics, science and engineering principles to design
ABET B: Ability to design and conduct experiments, analyze and interpret data.
ABET E: Ability to identify, formulate and solve engineering problems
ABET K: Ability to use the techniques, skills and modern engineering tools necessary for engineering practice

7. Brief list of topics to be covered:

1. Introduction To FEM Modeling
2. Review Of Mechanical Behavior Of Materials
3. Finite Element Nodes And Various Types Of Finite Elements
4. Types Of Constraints/Boundary Conditions
5. Validation Methods
6. Overview Of ANSYS Structure And Visual Capabilities
7. Selected Problems In Finite Element Analysis