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

1. **ENMA 496: Processing and Engineering of Polymers**

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: Dr. Brian Pate**

4. **Text book, title, author and year:** Osswald, Tim A., Understanding Polymer Processing: Processes and Governing Equations, Hanser Publications, ISBN: 978-3-446-42404-3.

5. **Specific course information**
   a. **Brief description of the content of the course (catalog description):** A comprehensive analysis of processing and engineering techniques for the conversion of polymeric materials into useful products. Evaluation of the performance of polymer processes, design of polymer processing equipment, effect of processing on the structure and properties of polymeric materials.
   b. **Pre-requisites or co-requisites:** ENMA 300 and permission of the Department
   c. **Indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program:** ENMA 496 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. Evaluate the relationship of polymer microstructure to processed product properties and performance.
      2. Understand the flow properties of polymer melts and how they influence the design of polymer processing equipment.
      3. Identify the features and design parameters of major industrial polymeric processing equipment.

   b. Explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed in this course.
   ABET C: Ability to design a system, component, or process to meet desired needs
   ABET E: Ability to identify, formulate and solve engineering problems

7. <u>Topics Covered</u>:

Specialized Methods of Polymer Synthesis
Phase Structure and Morphology of Polymers and Multicomponent Polymer Systems Polymer Viscoelasticity and Flow
Polymer Processing Methods and Equipment Polymer Yield, Crazing, Fracture, and Toughening Polymer Reinforcement and Composites
Electrical, Magnetic, and Optical Properties
Specialty Polymer Applications: Biomaterials, Electronics, and Nanomaterials
Degradation and Stabilization of Polymer Systems
Sustainability Considerations