



**University of Maryland at College Park**  
*Department of Materials Science and Engineering*

**ENMA 487: Capstone Preparation**

**Instructor:** Prof. Ray Phaneuf  
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Office Hours: Tuesdays, Thursdays 13:30-14:30, or by appointment

**Class Meets:** Online course; 5 meetings in CHE2118/CHE1302; Times TBA

**Course Description:** Preparation for senior level design course. Students will do background research, develop white papers, from which teams will form around short listed design projects, a full proposal and a preliminary design. The projects should focus on a society, industry, military or technological based problem in Materials Science and Engineering leading to a design and strategy to address the problem in the following course, ENMA 490. The format will be partly online, but will combine team work sessions and team/instructor meetings; there will also be 5 in-class meetings.

**Prerequisites:** Senior standing in Materials Science and Engineering

**Textbook:** NA

**Website:** Class materials will be posted at <https://myelms.umd.edu>

**Course Objectives (Mapable to ABET Criteria):**

The main objective is to allow students the opportunity to gain experience in: critical analysis of complex problems; design of materials systems and/or processes to address relevant problems; and teamwork. A student who takes this course should learn (1) to choose a design project based upon societal, industrial, military or technological relevance, along with a strong materials focus, and (2) to work as a team to apply fundamental knowledge of materials to a design problem.

**Materials Science & Engineering Measurable Skills (MSEMS):**

Student learns how to write a technical white paper proposing a research project; Student learns how to assemble a team to carry out a project.

**Grading:** Grading will be based on individual white papers (2-3 pages, 40%), Team Proposal (5-10 pages, 40%), Team Mid-project Design Report (10-15 pages, 40%)

**Relationship of course to program objectives:** This course is preparatory for one of the senior-level required courses in Materials Science and Engineering at the University of Maryland, and is intended to contribute toward the program objectives of (1) producing high quality graduates, (2) making sure that students can define and solve engineering and science problems, and (3) providing fundamental knowledge of materials to allow graduates to function professionally as materials scientists and engineers, and (4) preparing students to define engineering problems and design and engineer materials and manufacturing systems in flexible and creative way.

**Assignments, Classroom Etiquette and Academic Ethics:** Conscientious performance of assignments is essential to effectively complete a design as part of a research team. Briefings must be done in advance to allow for efficient discussion during the class periods. Participation is crucial.

The scope of this course is the selection of and preparation for a new design based upon societal, industrial, military or technological need. The work should be original and based upon the skills of the team. All new ideas build upon existing results; these must be properly acknowledged. Failure to do so constitutes plagiarism, which and will not be tolerated. Please see <http://www.shc.umd.edu/code.html> for a detailed discussion of this important issue.

Tentative schedule (\* denotes in class meeting)

Week 1 Introduction to the course\*

Week 2 – 3 Background research, draft white paper

Week 4 White Paper Presentations\*

Week 5 Select short list of topics & Form teams around short listed projects; Identify team Roles

Week 6-7 Develop Full Proposals

Week 8 Meet to Present Proposals \*

Week 9-13 Initial Design: background research; identify and seek out required resources, software, facilities; preliminary calculations/simulations/process design

Week 14 Draft Mid-project Design Reports

Week 15 Final meeting, present Midproject Reports\*