Course Information
ENME 421: Engineering Design Ideation
Spring 2016

Course Classification: Junior or Senior undergraduate student (3 semester hours)
Prerequisites: co-req ENME 371. ENME 371. This course should be taken prior to capstone design
Instructor: Dr. Linda Schmidt, lschmidt@umd.edu, Room 2104B Martin Hall
Meeting Times and Location: To Be Determined

Textbook:
There is no single textbook that includes material on all the methods to be covered in the class. Students will be directed to course notes, instructor copies of design texts, and other repositories of knowledge for design materials.

ENME 421 Catalog Description:
Engineering Design Methods is a technical elective for engineering students who wish to improve their ability to produce hints of concepts or design ideas (i.e., the ideation process) for further development into conceptual ideas. Ideation is the creative, idea generation activity that happens at the beginning of the conceptual design process. Ideation methods are often built around creativity improving strategies and are often designed for individual use prior to presenting the results in a team setting.

The ideation methods studied in the class will include Axiomatic Design, Synectics, Systematic Design with Functional Decomposition and Morphological Analysis, Biomimetic Design, Word Tree Method, and TRIZ. Course participants will learn to apply different ideation methods, developing their own idea creation tool box to take into their careers. Each participant will demonstrate understanding of methods by applying ideation methods to a variety of design tasks. Student learning outcomes will be assessed via design homework, writing homework on design methods, a required individual design journal, and examinations.

General Course Objectives:
- Given any of the design methods presented in the course, participant will be able to demonstrate an understanding of the method by:
  - Describing the method as a series of instructional steps and draw relationships between the method-specific steps and the general engineering design process.
  - Applying the method to an un-familiar but well-described design task to create a feasible solution.
  - Applying the method to a selected designing task to generate multiple ideas that could be developed into conceptual designs.
- Write essays with referenced evidence as required to discuss characteristics of the methods and to compare and contrast different ideation methods.

The Mechanical Engineering B.S. degree program is accredited by the Engineering Accreditation Commission of ABET, Inc. ABET is the recognized accreditor of college and university programs in applied science, computing, engineering, and technology. This course expects students to demonstrate competence in the areas defined by the following ABET Student Outcomes:
(a) an ability to apply knowledge of mathematics, science and engineering – in the form of mechanical design methods

(c) an ability to design a system, component, or process to meet desired needs within realistic constraints (The focus of ENME 421 will be ideation with an understanding of constraints to be applied in later stages of the design process.)

(g) an ability to communicate effectively – in the form of written assignments

(k) an ability to use the techniques (in the form of design methods), skills and modern engineering tool necessary for engineering practice.

Web Site:
Registered students are directed to the Canvas Course site for access to online course information. This site includes an up-to-date course schedule of lecture topics, assignments, due dates, and more. The course instructor will assume that students are accessing the latest course information online. Homework must be submitted via the online assignment portal.

Course Grading Elements: (Draft information for Spring 2016)

- **20% Individual Writing Assignments:** A series of at least 4 essays will be required over the course of the semester. Each essay must be original work. Electronic submission via the online course site is required by 9 AM on the Due Date.

- **20% Individual Design Method Performance:** A series of at least 4 problems will be assigned for completion by each student. This is to encourage sketching, commentary, and revision. Electronic submission via the online course site is required by 9 AM on the Due Date.

- **20% Mid-term Examination**

- **25% Final Examination (Comprehensive)**

- **15% Individual Design Journal:** Each student will be required to complete work on ideation assignments and other in-class activities in an instructor-supplied design journal. Students must bring the journal to class each day. The instructor will be reviewing journals on a bi-weekly basis to determine student understanding of the material. Some assignments will be done in journals with students required to scan the material for online submission.

It is the policy of the course instructor to apply the same performance expectations to all course participants regardless of their academic, employment, or linguistic background.

The following rubrics will be used to assess all assignments (writing in a student’s individual design journal does not need to meet these criteria):

- **Completeness & Accuracy** – the degree to which participant performance satisfies the required elements of the assignment in a way that would be judged

- **Clarity** – the degree to which the writer or speaker presents the work in appropriate language and in a logical order that can be understood by an engineering undergraduate student.

- **Professionalism** – quality of the communication including fundamentals of expression (e.g., grammar, spelling, sentence construction, effectiveness of visual materials) and proper citation of all material that is not original to the author or provided by the instructor for the
assignment. The IEEE Citation Style Guide should be used when preparing citations for referenced work. Evidence of plagiarism will result in an automatic referral of the matter to the Office of Student Conduct as required by the Code of Academic Integrity.

- Punctuality – Every student can turn in one assignment up to 48 hours late without an explanation or a penalty. Other late assignments are not accepted without penalty unless the incident is an excused absence as defined by the University or by prior arrangement with instructor. The penalty for a late assignment is 20% for up to 48 hours late; 50% for up to 96 hours late; and no assignments are accepted after 96 hours (4 days late).

**Academic Integrity and Academic Dishonesty:**

As a student you are responsible for upholding the University's standards of academic integrity during your participation in this course.

“On every examination, paper or other academic exercise not specifically exempted by the instructor, the student shall write by hand and sign the following pledge:

"I pledge on my honor that I have not given or received any unauthorized assistance on this assignment/examination."

Failure to sign the pledge is not an honors offense, but neither is it a defense in case of violation of this Code. Students who do not sign the pledge will be given the opportunity to do so. Refusal to sign must be explained to the instructor. Signing or non-signing of the pledge will not be considered in grading or judicial procedures. Material submitted electronically should contain the pledge, submission implies signing the pledge."

Academic Dishonesty is defined by the University to include cheating, fabrication, facilitation, and plagiarism. Plagiarism is the most relevant to the assignments of this course. Plagiarism will not be tolerated. All work presented to the instructor is assumed to be the original work of the course participant. Words, diagrams, figures, or original contributions of anyone other than a student must be referenced when included in a student’s work. The course instructor may request evidence of references for any submitted work and may use plagiarism checking software on submitted materials. Evidence of plagiarism will result in an automatic referral of the matter as required by the Code of Academic Integrity.\(^1\)

**Relationship of course to Program Outcomes:**

This course satisfies the following learning outcomes promoted by the DRs Division:

1. The ability to identify appropriate and scholarly published materials and interpret their contributions to the state of design research.
2. The ability to think critically about the design process as it relates to both practicing engineers and design researchers.
3. The ability to recognize consistent principals and approaches across a variety of design tasks or embodied in a solution methodology.
4. Recognition of the contribution of engineering design to society and culture.
5. The recognition that engineers must maintain ethical and professional standards and an appreciation of these standards.

**Attendance Policy:**

\(^1\) From the Office of Student Conduct [http://osc.umd.edu/OSC/AcademicHonorPledge.aspx](http://osc.umd.edu/OSC/AcademicHonorPledge.aspx)

\(^2\) The University’s policy on academic integrity can be downloaded at III-1.00(A) UNIVERSITY OF MARYLAND CODE OF ACADEMIC INTEGRITY [http://www.president.umd.edu/policies/iii100a.html](http://www.president.umd.edu/policies/iii100a.html)
Regular attendance at lectures is expected and attendance may be taken by instructors. Each student is responsible for inquiring about and obtaining course material delivered in their absence (from course colleagues).

It is the policy of the University to excuse the absences of students that result from the following causes: illness of the student, or illness of a dependent as defined by Board of Regents policy on family and medical leave; religious observance (where the nature of the observance prevents the student from being present during the class period); participation in university activities at the request of University authorities; and compelling circumstance beyond the student’s control. Students claiming excused absence must apply in writing and furnish documentary support for their assertion that absence resulted from one of these causes. Students with written, excused absences are entitled to a makeup exam at a time mutually convenient for the instructor and student. For more information, see the University's Attendance and Assessment Policy.

CourseEvalUM SPRING 2016:
To be added.