**COEN 4920 Principles of Design**

**Credits and contact hours:** 3 credit course, meeting for 2 hours lecture, 2 hours lab weekly.

**Course coordinator:** Dr. Chandana Tamma

**Texts:**

* *Principles of Design*, Marquette University
* *Technical Writing: A Practical Approach, 7th edition,* by Pfeiffer
* *Harvard Business School Project Management Manual*

**Specific course information**

1. **Catalog description:** Course content focuses on a structured product design and development process that includes project definition, customer needs identification, product specification, concept generation, and concept selection. Course also focuses on issues related to teamwork, project management, and effective communication. Student team design projects culminate in the development of a technically and economically viable concept and a proposal for future development of this concept (done in the second semester of this two-course sequence).
2. **Prerequisites:** Senior standing; Co-op students, junior standing.
3. **Required**
4. **Professional component:** Engineering Design - 100 %

**Specific goals for the course**

**Course Goals:** This course advances understanding and practice of the design process for Computer Engineering students. Projects are used to exemplify the concepts. This course is intended to develop each student’s: 1) analytical and design skills and capabilities, 2) ability to manage the product development process, 3) ability to work effectively in teams, and 4) written technical communication and oral presentation skills. Students will be exposed to a results-oriented evaluation of their design projects. The final deliverable of this course is a proposal for a design concept that will meet customer needs.

1. **Specific outcomes of instruction***By the end of this course, students should be able to perform the following tasks:*
	1. Function in multi-functional integrated product development teams and apply methods that facilitate team creativity.
	2. Apply common tools and practices and structured methods needed to manage the design process in multi-functional teams.
	3. Apply common tools and techniques from the study and the practice of Computer Engineering to design a customer-centric solution to a practical problem.
	4. Apply economic factors influencing project selection and the engineering economics considerations (e.g., time value of money, cash flow diagrams, various means of calculating the return on investment) that impact the resources available for the implementation of a design.
	5. Search for the various types of intellectual property (e.g., patents, trade secrets, copyrights, and trademarks).
	6. Maintain a laboratory notebook required for the patent application process, the means of preserving patent rights, and patent licensing procedures.
	7. Apply techniques for good technical writing, technical document structure, proposal writing, and oral communication.
2. **Student outcomes addressed by the course:**Partial fulfillment of Criterion 3 objectives A, C, D, E, G, J, K

**Brief list of topics to be covered**

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| * Introduction to the design process
* Menu of available projects
* Services of the Career Center
* Project management
* Problem identification – Project definition
* Design constraints
* Patents and other forms of intellectual property
* Institutional Review Board requirements
* Customer needs – Target specifications
* Teamwork
* Human factors in design
* Agile methodology
 | * Unified Modeling Language
* Converting specifications into concepts
* Problem-solving methods
* Concept generation/selection
* Cost/benefit analysis
* Test-driven development
* Data flow diagrams
* Modeling and simulation
* Business basics
* Developing mobile applications
* Entrepreneurship
* Presentations
* FPGAs
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Last modified: November 17, 2017