**Course number and name:**
EL 4395 – Design Capstone I: Definition & Exploration

**Course Description:** This course is the first semester of a two-semester capstone design course in engineering leadership. Particular focus is on defining (specifications) and exploring (ideation) various project designs in which engineering leadership skills are applied to build a cohesive team and to successfully execute an effective company engineering/research project.

**Course Credit:** 3  
**Contact Hours:** 8

**Prerequisites:** MATH 2313, CE 2338, EL 3304 (or as determined by Catalog of Student)  
Students must have a 2.5 GPA or better in engineering coursework.

**Cross/Co-listed with:**

**Instructor/Course Coordinator:** David Novick

**Textbook(s) & required materials:**
- *Leadership – Theory & Practice* by Northouse
- *Designing Your Life* by Evans and Burnett

Selected readings to be assigned from the professor as well as the industry mentor

**Course Learning Outcomes:**
On completion of the course, the student will be able:

1) To demonstrate knowledge of the general scope and feasibility of various design constraints and design options to solve a defined problem
   1. To demonstrate that the design has met objectives by considering various alternatives and meeting predefined constraints
2) To understand both the impact of engineering solutions in a global and societal context and one’s professional and ethical responsibility
3) To consider multi-disciplinary projects and produce prototypes
4) To consider, develop and apply key aspects of individual and team leadership
5) To explain business acumen related to costs, capital expenditures, and taxation

**Relationship to Program Outcomes:** Recognize need for additional knowledge; recognize leadership issues, recognize leadership built on character, capacity, and competence

**Grading Scheme:**
70% team project performance: Weekly SCRUM reports (10%), team presentations (20%), mentor evaluation (15%), design notebook (25%). Within each team, the project score will be adjusted individually based on team-member peer evaluation of contribution.

30% individual performance: Homework (5%), quizzes (12.5%), exam (12.5%).
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<th>Sample Topics:</th>
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<tr>
<td>1. <strong>Understanding real world problems</strong> (decisions and tradeoffs; documentation and reporting; project scheduling and budgeting; vendor relations; sponsor input and change of scope; resource limitations; ethics and safety; confidentiality)</td>
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<td>2. <strong>Leadership and team building</strong> (division of work and delegation; authority, responsibility and accountability; resolution of personal conflicts; utilization of a variety of talents and skills; personnel evaluation and feedback)</td>
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<td>3. <strong>Engineering design process</strong> (proposal, negotiation, contract, execution and evaluation; feasibility studies; preliminary design; detailed design; revision; release; field testing; production; salvage)</td>
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<td>4. <strong>Application of course material</strong> (recognize applications and limitations; balance analysis, experimentation, computation, simulation, and optimization; assess models using prediction and other validation)</td>
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<td>5. <strong>Gain real world insights</strong> (develop career goals; learn about patents and notebook recording; get acquainted with engineers and companies; sense the complexity, difficulty and time involved in solving real problems)</td>
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<td>6. <strong>Business acumen</strong> (responsibility accounting and cost control through standard costs, relevant costing in nonroutine decisions, evaluating capital expenditure projects, how taxes affect business decisions)</td>
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