### 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.

### Instructor/Course Coordinator:
Roger Gonzalez & David Novick

### Textbook(s) & required materials:
- *Leadership – Theory & Practice* by Northouse

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

### Contribution to professional component:

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

### Grading Scheme:
Weekly SCRUM reports: 10%; design notebook: 25%; team presentations: 20%; mentor evaluation 15%; homework 5%; quizzes 12.5%; exam 12.5%

### Sample Topics:
1. Understanding real world problems (decisions and tradeoffs; documentation and reporting; project scheduling and budgeting; vendor relations; sponsor input and change of scope; resource limitations; ethics and safety; confidentiality)
2. Leadership and team building (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)
3. **Engineering design process** (proposal, negotiation, contract, execution and evaluation; feasibility studies; preliminary design; detailed design; revision; release; field testing; production; salvage)
4. **Application of course material** (recognize applications and limitations; balance analysis, experimentation, computation, simulation, and optimization; assess models using prediction and other validation)
5. **Gain real world insights** (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)
6. **Business acumen** (responsibility accounting and cost control through standard costs, relevant costing in nonroutine decisions, evaluating capital expenditure projects, how taxes affect business decisions)