Master Course Description

No: EE 496

Title: ENGINEERING ENTREPRENEURIAL SYSTEMS AND DESIGN

Credits: 2

Coordinators: John D. Sahr, Professor of Electrical Engineering; Payman Arabshahi, Associate Professor of Electrical Engineering

Goals: To learn fundamentals of systems engineering, feasibility studies, project management and design, budgeting, procurement, and associated tools. To apply these topics to Entrepreneurial capstone projects starting mid-quarter, and carry them through to EE 497/498 (Entrepreneurial Capstone I/II), and thus to lay the foundation for these two courses in winter and spring.

Learning Objectives: At the end of this course, students will be able to:

1. Understand and manage the development of complex technical and organizational systems.
2. Have the ability to apply quantitative techniques and analysis in the design of hardware/software systems.
3. Recognize the connections between applied engineering and practical management.
4. Analyze business problems better to formulate strategy, tactics, plans and policies.
5. Gain the ability to engage in creative problem solving.
6. Improve on abilities to lead and manage.
7. Learn how organizations use technology for competitive advantages, and in support of business strategies.
8. Engage with relevant ethical principles and apply core concepts to industry projects,
9. Complete preliminary phases of an applied R&D project.
10. Have the ability to contribute to industry innovation and research.

Textbooks:


Reference Texts:

Prerequisites:

- Senior standing.

Topics:

Systems Engineering

- System life cycle & systems engineering methods
- Requirement analysis
- Concept development, design & integration
- Functional analysis
- Work breakdown structure
- Trade studies
- Risk mitigation

Entrepreneurship

- Idea pitches, team formation, lean canvas
- Equity, company formation, founder roles, case studies
- Idea validation, lean experiments
- Raising capital, grants and competitions, startup accelerators
- IP and patents, licensing
- Scaling and growth

General

- Project Management and Scheduling Tools and Techniques
- Oral Presentations
- Budgets, Procurement, Balance Sheets
- Prototyping

Course Structure: The class meets for one 80-minute lecture a week. Lectures, homeworks, business and technology case studies, and classroom discussions will be reinforced with start of work on industry group projects.
Computer Resources: Homeworks and projects can be done on any PC.

Laboratory Resources: None.

Grading:

Homeworks: 40% - Every week. Homework will be graded/checked mainly for completion, and the amount of qualitative thought that goes into each answer.

Project: 60% - Based on a new design or existing design, which will be broken down and reconstructed using the Systems Engineering Process.

Outcome Coverage:

Homeworks and project(s) assigned will have good coverage of the following outcomes:

a. An ability to apply knowledge of mathematics, science and engineering
b. An ability to design and conduct experiments, as well as to analyze and interpret data
c. An ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability
d. An ability to function on multi-disciplinary teams
e. An ability to identify, formulate and solve engineering problems
f. An understanding of professional and ethical responsibilities
g. An ability to communicate effectively
h. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice

Prepared By: Payman Arabshahi

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