

# ECE 483 Syllabus

**Course:** ECE 483

**Credit Hours:** 3

**Course Title:** Engineering Entrepreneurship and New Product Development II

**Course Description:**

ECE483 is the second in a two-semester senior capstone design sequence (ECE482, Engineering Entrepreneurship and New Product Development I being the first) and is a full-immersion, multidisciplinary, engineering experience that has been holistically designed to integrate the skills and knowledge that students have learned in their engineering studies. This methodology provides the students a more in-depth exposure to new product and business development and to the engineering profession. ECE483 is a 3-credit course where students, working in multidisciplinary eTeams (entrepreneurship teams), take their ideas and plans from ECE 482 and implement a prototype new technology-based product and its associated business plan. In addition to these, they are required to run their eTeams as virtual startup companies where they assume the roles of company founders and to recruit students from the 1-credit ECE383 course to participate on their eTeams as virtual employees. The students will further develop their ideas from ECE482 by performing detailed low-level engineering design, analysis, and implementation. They will also create a full business plan, a virtual company website, give several presentations, and compete in both the end-of-semester Plexus Presentation Competition and in the NC State Entrepreneurship Initiative's eGames.

**Prerequisite(s):** ECE482, ECE383 (ECE383 is waived under special circumstances) and 2 400 level courses in their specific discipline.

**Textbook(s) and/or other required material:**

'The Monk and the Riddle', by Randy Komisar, Harvard Business School Press, ISBN 1-57851-644-7 (paper), 2000, Price: \$11

'The Art of the Start, by Guy Kawasaki', PORFOLIO - published by the Penguin Group, ISBN 1-59184-056-2 (hardcopy), 2004, Price: \$17

'Getting Started as an Entrepreneur: A Guide for Students', by the National Collegiate Inventors and Innovators Alliance, 2002, Price: \$14

Reference Texts Only (Texts are made available for use by the students)

'Technology Ventures: From Idea to Enterprise', by Richard C. Dorf and Thomas H. Byers - published by McGraw-Hill, ISBN 0-07-304466-0, 2007, Price \$76

**Course objectives. By the end of this course, the student should be able to (use demonstrative verbs):**

1) Identify a real-world problem and apply engineering and entrepreneurial skills to analyze, design, and implement a new technology-based prototype product and associated business plan.

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- 2) Use formal product development and project tools to create and track project development and management plans.
- 3) Work effectively and efficiently as a leader and member of a team.
- 4) Based on work created in ECE482, further develop their business planning and presentation skills.
- 5) Create and deliver several high-quality presentations as part of their course requirements and to participate in the NC State Entrepreneurship Initiative s eGames.
- 6) Evaluate the environmental, societal and ethical impacts of their new product and business ideas

## **Topics covered:**

- 1) Project Management
- 2) Manufacturing
- 3) Design and Test
- 4) Business Planning
- 5) Engineering Ethics

## **Class/laboratory schedule (sessions per week and duration of each session):**

The class has two 75 minute sessions per week.

## **Contribution of course to meeting the requirements of Criterion 5 - other:**

ECE483 is the second semester of a two-semester senior capstone design course sequence (ECE482 and ECE483) in the Engineering Entrepreneurs Program (EEP). As such, ECE483 students are exposed to the engineering design practice. Here they learn how to incorporate engineering standards and real-world constraints to identifying problems and articulating their solutions. In addition, they learn how to lead and to work effectively and efficiently in multidisciplinary eTeams (entrepreneurship teams), and to create and apply ethical business and engineering processes into their eTeam management and culture.

## **Contribution of course to meeting the requirements of Criterion 5 - math and basic sciences:**

ECE483 students are part of eTeams (entrepreneurship teams) that perform substantial amounts of engineering research, design and analysis. They will, at times, be expected to apply their understanding of mathematics and basic science to the design and development of their eTeam's prototype new technology-based product. Some examples include statistical analysis, mathematical modeling and simulation, the use of design tools such as SolidWorks, and the use of modern computer systems and languages.

## **Contribution of course to meeting the requirements of Criterion 5 - engineering topics:**

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In ECE483, students apply fundamental engineering principles in identifying real-world problems and in articulating their possible solutions. This process is always an iterative one where students continually compare/contrast various solution options to the realities of budgets and deadlines. It is hoped that as students move through the course that they begin to develop, and continue to improve on, an intuitive grasp of engineering design and its tradeoffs thereby providing a bridge between engineering theory and engineering practice.

## **Contribution of course to meeting the requirements of Criterion 5 - general education:**

ECE483 is part of the Engineering Entrepreneurs Program which is a full-immersion educational environment for new product and business prototyping that has been holistically design to improve the overall undergraduate educational experience. This is accomplished by creating multidisciplinary eTeams (entrepreneurship teams) comprised of undergraduate students from all grade levels in engineering, science, business, industrial design, and the arts and humanities. In addition to engineering, math and science, students are exposed to advanced technical writing, presentation skills, business and engineering ethics, intellectual property, and graphic and industrial design.

## **Relationship of this course to program learning outcomes:**

<b>Learning Outcome</b>	<b>Level of Instruction</b>	<b>Related Course Content</b>
Outcome A	Major	Students learn to identify real-world problems and to apply their engineering skills to analyze and design concept prototype products to solve the problems.  Students use their engineering design and analysis skills in both the creation of product functional, design, and test specifications, and in the analysis of collected data at the various project milestones. In addition, they use formal project management tools to create, track and analyze their project development and management plans.
Outcome B	Major	

**Relationship of this course to program learning outcomes:**

<b>Learning Outcome</b>	<b>Level of Instruction</b>	<b>Related Course Content</b>
Outcome C	Major	<p>In learning to identify real-world problems and to apply engineering skills to solve them, students are developing and honing their system design and analysis skills. During this process, they evaluate the tradeoffs inherent in creating a new product that meets a customer need at a defined price-point, while working within a predefined budget.</p> <p>In prototyping a new product students work as members of multidisciplinary eTeams. eTeams are typically composed of undergraduate students from various engineering disciplines and business. But, have also included students from industrial design, and the arts and sciences.</p> <p>Students attend lectures on product design and development, project management, as well as seminars covering topics ranging from industrial design to product manufacturing. Students also lead brainstorming sessions - overseen by course instructors - on problem identification and solution evaluation.</p>
Outcome D	Major	
Outcome E	Major	

**Relationship of this course to program learning outcomes:**

<b>Learning Outcome</b>	<b>Level of Instruction</b>	<b>Related Course Content</b>
Outcome F	Intermediate	<p>Students attend seminars given by industry professionals on professional and ethical responsibility, and lead/participate in either in-class or out-of-class discussions on these topics as they specifically apply to their eTeam.</p>
Outcome G	Major	<p>Students attend special lectures/workshops given by a member of the English Department and by an NC State Librarian on technical writing, presentations and research. In addition, they are required to give three formal presentations and to create and submit the following documents/presentations: eTeam Recruitment Presentation, eTeam Organization Chart, Industry Analysis, SWOT Analysis, eTeam Member Agreements, Competitor Analysis, Logo, eTeam Webpage, Intellectual Property Search, Market Analysis, Project Plan, Functional Specification, Pro Forma Financial Projections, Marketing &amp; Sales Plan, Design &amp; Test Specifications, Investor Presentation, and Final Presentation.</p>

**Relationship of this course to program learning outcomes:**

<b>Learning Outcome</b>	<b>Level of Instruction</b>	<b>Related Course Content</b>
Outcome H	Major	<p>In addition to the significant amount of research and documentation required of the students, they attend seminars given by industry professionals and academics on product development, corporate formation, sales and marketing, technical and business research, venture capital, intellectual property, and team dynamics, to name a few.</p>
Outcome I	Intermediate	<p>Being eTeams leaders, these students are constantly faced with creating, completing, and assigning tasks that are typically outside their current knowledge and comfort zones. As such, they learn, with the help of their faculty, how to go about obtaining the knowledge they require to complete their tasks and to understand the impact that life-long learning will/has on their future success.</p>
Outcome J	Intermediate	<p>Students attend seminars given by industry professionals and academics on various contemporary issues. In addition, they learn the fundamentals of business research which exposes them to current news and</p>

**Relationship of this course to program learning outcomes:**

<b>Learning Outcome</b>	<b>Level of Instruction</b>	<b>Related Course Content</b>
Outcome K	Intermediate	events. In comparing/contrasting potential new product ideas, the students define both individual and small group assignments that typically require the application of known skills and the acquisition of new ones that involve the use of modern engineering tools, i.e. MATLAB, php, SolidWorks, etc.

**Person who last prepared this description and date of preparation:**

- Walsh, Stephen J (sjwalsh) - Oct 8th, 2009 (07:13am)