Integrated Innovation Institute

Peter Boatwright
Co-Founder, Director of III, Allan D. Shocker Professor of Marketing and New Product Development
Email: pbhb@andrew.cmu.edu
www.cmu.edu/iii (http://www.cmu.edu/iii/)

About Integrated Innovation

The Integrated Innovation Institute at Carnegie Mellon University breaks down the silos that impede innovation. The Institute believes that by uniting the disciplines of engineering, business and design we can create build impactful product and service solutions that create real value for real people.

For over 30 years, the institute has imparted to students a tried-and-true methodology to innovating products and services. Through dynamic projects, students learn to create solutions that: function effectively with the right technologies (engineering); improve the lives of individuals (design); and create economic value in the marketplace (business).

Engineering Design, Innovation, and Entrepreneurship (EDIE) Additional Major Overview

As humanity grapples with dilemmas of extraordinary complexity throughout the globe, our world needs engineers who are leaders and change makers. Our world needs engineers who seek to push the boundaries in their education, and carry their passion for technological innovation forward.

The Engineering Design, Innovation, and Entrepreneurship (EDIE) additional major will provide students the know-how to innovate products around that technology and deliver product solutions to the people who need them.

EDIE students will have expertise in technology and the ability to design, develop, and deliver economically viable solutions to the real-world challenges of today and tomorrow.

Students who elect Engineering Design, Innovation & Entrepreneurship (EDIE) as a major must also declare a major in one of the traditional engineering disciplines:
Chemical Engineering, Civil Engineering, Electrical & Computer Engineering, Environmental Engineering, Materials Science & Engineering, or Mechanical Engineering.
The curriculum, demanding but readily feasible to complete in four years, is highly rewarding to motivated students.

Common Requirements for the Additional Major:

The EDIE additional major program takes advantage of curricular overlaps between EDIE and traditional engineering majors, such that the additional major can be completed in four years with only a modest increase in course requirements. The courses requirements for EDIE consist of foundational skills, Engineering Design and Innovation, Engineering Entrepreneurship and two capstone experiences. The foundational skill courses focus on the fundamentals of microeconomics and public speaking. With core courses in engineering design, innovation and entrepreneurship are designed for engineers to learn with engineers, building on the fundamentals in their primary degree. Finally, students complete two capstone courses to explore real-world applications.

The additional major in Engineering Design, Innovation & Entrepreneurship should be declared at the same time when declaring a traditional engineering major.

Some courses for the EDIE additional major may also satisfy requirements for traditional engineering courses or for general education courses.

Course Requirements for the Additional Major

Curriculum Details

The EDIE additional major isn't just for students who want to create a startup—it will help to prepare hands-on, get-it-done leaders who are in demand in all sectors of society and industry, for-profit and not-for-profit. Given the applied focus of our curriculum, courses will equip our students with mindsets, skills, and capabilities to identify and shape opportunities and develop economically sustainable solutions.

Students in the EDIE additional major must also satisfy the core requirements of their primary major typically following the standard schedule of courses each semester. EDIE core requirements are fulfilled in addition to the course requirements of their primary major, mainly using various elective units. The side-by-side curriculum charts for each primary major show how the requirements for the stand-alone majors and the primary major plus EDIE additional major compare.

Course Requirements

Introductory Course
49-101 Engineering Design, Innovation and Entrepreneurship (12 units)

Engineering Design and Innovation Courses
49-305 Customer Discovery for Tech Innovation (4.5 units)
49-306 Engineering Design Methods & Tools (4.5 units)
49-405 Leading Engineering Innovation Teams (4.5 units)

Engineering Entrepreneurship Courses
49-205 Tech Venture Marketing for Engineers (4.5 units)
49-206 Tech Business Planning (4.5 units)
49-406 Tech Venture Formation (4.5 units)

Foundation Skills Courses
73-102 Principles of Microeconomics (9 units)
70-345 Business Presentations (9 units)

Home Department Engineering Design Capstone (12 units)

Please consult with your home engineering department to confirm the specific Engineering Design Capstone course(s) that apply to your primary engineering degree. 12 units will count towards your EDIE degree requirements.

49-420 EDIE Innovation Capstone Course (9 units)
49-421 EDIE Entrepreneurship Capstone Course (9 units)

Course Descriptions

About Course Numbers:

Each Carnegie Mellon course number begins with a two-digit prefix that designates the department offering the course (i.e., 76-xxx courses are offered by the Department of English). Although each department maintains its own course numbering practices, typically, the first digit after the prefix indicates the class level: xx-1xx courses are freshmen-level, xx-2xx courses are sophomore level, etc. Depending on the department, xx-6xx courses may be either undergraduate senior-level or graduate-level, and xx-7xx courses and higher are graduate-level. Consult the Schedule of Classes (https://enr-apps.as.cmu.edu/open/SOC/SOCServlet/) each semester for course offerings and for any necessary pre-requisites or co-requisites.

49-101 Introduction to Engineering Design, Innovation, and Entrepreneurship
Fall and Spring: 12 units
This course will introduce formal innovation and design methods to form new opportunities, product/service solutions, and ventures within a team-based project, with particular emphasis on the translation and integration of technologies into products, services, and venture solutions. The skills learned in this course can be applied to the for-profit sector and also in the context of projects for social good. Effective communication of ideas will also be emphasized. This semester-long course will combine lecture and studio activities.

49-205 Tech Venture Marketing for Engineers
Spring: 4.5 units
Designed for engineers, this course will cover key strategic and tactical marketing concepts and methods: product adoption life cycle, customer segmentation, strategic market planning and tactical considerations, with special considerations for new high-tech engineering products and innovations. This course will equip technologists with a marketing perspective, equipping them to achieve market adoption and sales growth.

49-206 Tech Business Planning
Spring: 4.5 units
Tech Business Planning focuses on the design of a technology-based venture. Students will learn to craft a business plan: fleshing out a value proposition for key customer segments, specifying how that value is delivered and by whom, designing key activities of the business, identifying business relationships, working through the cost structure, and estimating revenue streams. Students will base their business planning on information provided to them in this course (technology context, customer data, regulatory constraints, etc.) The skills taught in this applied course are relevant to both startups and to new ventures within existing organizations.

49-300 Integrated Product Conceptualization
Fall: 12 units
The Integrated Product Conceptualization course focuses on introducing students to some of the thinking, basic skills and methods used by industrial design, engineering, and business to generate new consumer product proposals within integrated teams. Teams will progress through three phases 1) identifying opportunities for new products or services, 2) understanding those opportunities through stakeholder research, value opportunity analysis, and competitive landscape assessment, then selecting one of which to focus, 3) conceptualizing the opportunity with the goal of meeting the value proposition. This course will combine lecture and studio activities including the generation of 2D visual representation skills and 3D low-fidelity physical modeling in support of course work. An important part of this course is a design project that is carried out by interdisciplinary teams. In order to effectively contribute to their team, each student should have experience or coursework in at least one of the following: design, the arts, engineering/technology, or business. This course is reserved for junior and senior level students. Freshmen and sophomores will be admitted as space allows and with instructor permission.

49-305 Customer Discovery for Tech Innovation
Fall: 4.5 units
This course guides students through determining the need for research, planning and executing several iterations of stakeholder (e.g., end users, customers, ...) engagements with different UX research methods, analysis of data, analyzing impact of findings on product design in technology domains. Given that extant data often are not prevalent to aid early product innovation decisions, the course is focused primarily on qualitative data, although some time is spent to source quantitative data and leverage a mixed approach.

49-306 Engineering Design Methods & Tools
Fall: 4.5 units
This course will teach engineering design methods and tools from concept to realization. Topics include embodiment design, product architecture and platform design, decision making, design for production, cost analysis, quality and total quality management. The course will address systems design, physical embodiment, and interaction design.

49-405 Leading Engineering Innovation Teams
Spring: 4.5 units
Innovation teams are not like other teams because innovation is different; the problem objective may have been outlined, but the teams workflow journey and output destination are full of unknowns and un-trieds. The innovation team must be led at each key step along the way with the goal of engineering an innovation that delivers market success. Based on research and practice, this course covers leadership principles that specifically apply to leaders of innovation, which can considerably improve the chances of a successful innovation team.

49-406 Tech Venture Formation
Spring: 4.5 units
The course will cover key aspects for venture formation: intellectual property; deal structures, term sheets and contracts; venture financing and financial statements. Although presented in the context of technology startups, these frameworks and methodologies are useful for corporate new-business-development and new-market-entry as well.

49-420 EDIE Innovation Capstone
Fall: 9 units
In this course, students work in a team-based project, starting from an open-ended problem area and concluding with a refined product/service concept. Methods and skills from prior classes (e.g., innovation process and methods, customer discovery, engineering design) will be applied and practiced by the team. The skills learned in this course can be applied to the for-profit sector and also in the context of projects for social good.

49-421 EDIE Entrepreneurship Capstone
Spring: 9 units
In this course, students work in a team-based project, starting from a new product concept and concluding with a well-designed venture and a launch plan. Methods and skills from prior classes (e.g., customer discovery, engineering design, tech business planning) will be applied and practiced by the team.

Full-Time Faculty

ELLEN AYOOB, Program Director, Master of Integrated Innovation for Products and Services – Master of Design in Communication Planning and Information Design, Carnegie Mellon University;

PETER BOATWRIGHT, Co-Founder, Director of iii, Allan D. Shocker Professor of Marketing and New Product Development – Doctor of Philosophy (PhD) in Business, University of Chicago;

BRANDON BODILY, Assistant Teaching Professor – Master of Science in Aerospace Engineering, Purdue University;

SUSANNA ZLOTNIKOV, Online Program Director & Assistant Teaching Professor – Master of Design, Carnegie Mellon University;