

# UNDERGRADUATE CERTIFICATE IN INNOVATION, PRODUCT DESIGN, AND ENTREPRENEURSHIP

## 1.0 BACKGROUND and OBJECTIVES

Innovation and entrepreneurship has been credited as being a key driving factor in the US economy. Even inside the corporation, employers seek engineers with skills to contribute to the rapid movement of products from conception to market. With this emphasis on minimizing the time to market whether in a startup or a large corporation, it has become essential for engineers to *integrate business strategies and customer focus with new products design skills*. The *Certificate in Innovation, Product Design, and Entrepreneurship* cuts across the Swanson School of Engineering and into the College of Business Administration to offer students the diverse skills to complement their technical engineering focus.

The *objectives* of the Certificate in Innovation, Product Design, and Entrepreneurship are:

- *To close* the current competency gaps that exists between academia and industry in the areas of design, innovation and product creation.
- *To provide both the academic and theoretical basis* for innovation and entrepreneurship and practical, hands-on experiences that allow students to practice what they have learned in the classroom.
- *To prepare* students for taking an idea from concept to fruition as a potential start-up company or inside a corporation or other organization.
- *To offer* a benchmark educational program that can serve as a model throughout academia.

Coursework in the certificate takes advantage of state-of-the-art facilities, including:

- *Swanson Center for Product Innovation (SCPI)*, a traditional machine shop and high-resolution prototyping facility
- A student *MakerSpace*, a low-resolutions design and prototyping facility, and
- The Art of Making design studio, a design thinking classroom and prototyping space

The certificate is designed for undergraduate engineering students. Students from all engineering departments and qualified CBA, DSAS and SHRS students can participate in the certificate.

## 2.0 CURRICULUM

The revised *Certificate in Innovation, Product Design, and Entrepreneurship* will specifically target competency gaps that exist in the following educational areas:

- Design thinking,
- Additive manufacturing,
- Virtual and rapid prototyping techniques,
- Integrated electronics and physical systems,
- Low and high resolution prototyping,
- Business aspects of product creation

The certificate includes coursework from the Swanson School of Engineering, College of Business Administration and the School of Health and Rehabilitative Sciences (SHRS), in addition to two programs from the University's Innovation Institute. This curriculum includes a wide range of courses focused on product design, innovation and entrepreneurship, involving both private sector and non-governmental organizations perspectives. The certificate is designed to enable any of our undergraduate engineering students, as well as qualified CBA, DSAS and SHRS students with an interest in the process of innovation, product development, and entrepreneurship to participate.

Students will take a total of five courses including a capstone design experience (15 credits total). Students may substitute one of two Innovation Institute programs in lieu of a course requirement. The engineering courses will provide the necessary exposure in complementary fields to the students' major, as well as foundational theory and knowledge and hands-on engineering applications. The courses are delineated below.

Students will take a total of five courses (15 credits) in the areas and numbers defined below.

**AREA 1: Entrepreneurship (students will choose at least one course. Note that only one College of Business course may be used to meet Certificate requirements)**

- ENGR 1060: Social Entrepreneurship – Engineering for Humanity
- IE 1039: Entrepreneurship for Engineers
- ENGR 1080: Lean Launch Pad (Spring - requires permission by instructor; may be used for Area 1 or Area 3 but not both)
- ENGR 1061: Intrapreneurship: Entrepreneurship within the Corporation
- BUSENV 1790 Social Entrepreneurship
- BUSSPP 1750: Commercializing New Technologies
- BUSORG 1640 The Entrepreneurship Process
- The Innovation and Entrepreneurship Living Learning Center (note, this is non-credit; participants need only 12 credits for the certificate)

**AREA2: Engineering and SHRS Innovation and Product Design Courses (students will choose at least two)**

- ENGR 716 H: The Art of Making (Freshman Honors Section) **or** ENGR 1716: The Art of Making

- ENGR 1050: Product Realization
- ENGR 1716: The Art of Making: An Introduction to Hands-On System Design and Engineering
- CEE 1609: Life Cycle Analysis Assessment Tools
- CEE 1618 Design for the Environment
- HRS 1706: Intro to Rehab Engineering Design
- IE 1052: Manufacturing Processes and Analysis
- IE 1089: Rapid Prototyping Additive Manufacturing
- MEMS 0024: Introduction to Mechanical Engineering Design
- MEMS 1049: Mechatronics
- ECE 1160: Introduction to Embedded Systems Design
- ECE 1161: Embedded Computer Systems Design
- ECE 1188: Cyber Physical Systems
- Special permission courses in Area 2 (special permission required by offering department):
  - ChE 314: Taking Products to Market – Next Step in Chemical Product Design (Fall – requires permission by instructor)
  - BIOENG 2150: Medical Product Ideation (Fall - with instructor's permission)
  - MEMS 1032: Automotive Design and Fabrication (anytime – requires instructor's permission)

**AREA 3: Capstone Design Courses (students will choose one of these courses or the Blast Furnace Program)**

- ENGR 1050: Product Realization or ENGR 1610: Product Realization for Global Opportunities (offered all three terms)
- ENGR 1080: Lean Launch Pad (requires instructor's permission; may be used for Area 1 or Area 3 but not both)
- ENGR 2811: Hacking for Defense (by application)
- HRS 1718: Project Based Technology Design
- Blast Furnace hosted by the Innovation Institute (note, this is non-credit; students participating in Blast Furnace need only 12 credits upon completion of the Blast Furnace requirements)
- Special permission courses in Area 3 (special permission required by offering department):
  - ChE 414: Chemical Product Prototyping (Fall; For Chemical Engineering students; Permission by instructor necessary)
  - BIOENG 2151: Medical Product Development (Spring; with instructor's permission)

### **3.0 ADMISSION AND COMPLETION REQUIREMENTS**

- A minimum 2.5 QPA is required for students to participate in the certificate. Further a QPA of 2.5 in the five courses is required to obtain the certificate.
- Students fulfilling the requirements of the Certificate will receive notification on their permanent academic transcript. In addition, such students will be recognized publicly at the Senior Recognition Night that the School of Engineering hosts each year for graduating seniors and their families.

### **4.0 FOR MORE INFORMATION**

Students wishing to participate in the certificate program may contact their respective undergraduate coordinator or the Director of the Innovation, Product Design, and Entrepreneurship program:

Professor William W. Clark  
412-624-9794  
BEH 218H  
[wclark@pitt.edu](mailto:wclark@pitt.edu)