E-Learning Modules

Each eLearning module and contextual activities cover one or more entrepreneurially minded learning (EML) outcomes and complementary skills. Below you will find a brief description for each module.

Adapting a Business to a Changing Climate: The module *Adapting a Business to a Changing Climate* is designed to help students learn how changing business environments can negatively impact a company and what strategies can be used to adapt to the new conditions.

Applying Systems Thinking to Complex Problems: The module *Applying Systems Thinking to Solve Complex Problems* module can be used by instructors in a variety of classes to illustrate the systems-approach when the problems are ill-defined or multi-tiered in complexity. Instructors can use it to show how to apply some basic tools such as function mapping, decomposition and heuristic rules to make complex problems less complex. The tools also help users avoid common mistakes such as mismatched interfaces between sub-systems.

Building Relationships with Corporations and Communities: The module *Building Relationships with Corporations and Communities* teaches students to work with corporations and communities. Students often don't realize how important relationships with corporations and communities are to successful engineering projects. This module introduces them to the topic of working with organizations and teaches them ways to build relationships with organizations and communities so that they can help projects run smoothly. They learn ways of thinking about corporations and communities that make it easier to work with them. They also learn how to approach them without defensiveness and think about how to use their input to improve designs.

Building, Sustaining and Leading Effective Teams and Establishing Performance Goals: The module *Building, Sustaining and Leading Effective Teams and Establishing Performance Goals* is highly recommended for all engineering and science students since they will invariably work in teams during their careers. Industry desires engineers who can succeed in a team setting and formal instruction regarding teamwork is therefore beneficial for engineering students. This module is designed to increase the understanding of personal characteristics and group dynamics on team performance and help resolve conflicts that might arise in team settings.

Cost of Production and Market Conditions: The module *Cost of Production and Market Conditions* is designed to help students learn how to determine the cost of production. Furthermore, the module introduces the students to various market structures, and their impact on the cost of products.

Defining and Protecting Intellectual Property: As engineering professionals' students will participate in and lead development of confidential and patentable intellectual property projects during their career. A basic working knowledge of intellectual property concepts and law are essential for engineers and scientists seeking a career in the business world. The purpose of the module *Defining and Protecting Intellectual Property* is to provide the student with this background.

Developing a Business Plan That Addresses Stakeholder Interest, Market Potential and Economics: The module *Developing a Business Plan* is designed to inform students how to develop a standardized approach for creating, optimizing and presenting business plans for new product and service companies.

Developing Customer Awareness and Quickly Testing Concepts through Customer Engagement: For engineered products to be successful, they must accurately fulfill the requirements of the product's stakeholders and create value. To address this need, designers use formal design tools to assist in understanding and identifying the stakeholders and their respective requirements. The module *Developing Customer Awareness and Quickly Testing Concepts Through Customer Engagement*, introduces students the general process of selecting stakeholders, generating requirements, and integrating empathy in design. Moreover, students will recognize that empathy has an impact on the requirements you are able to elicit for their design (a sign of connection with the product/user) and the value they can generate for stakeholders. Moreover, design empathy activities will be provided to help them overcome the challenges of lacking empathy.

Determining Market Risks: Many novice engineers think their work is finished when the technical solution to a problem is reached. In reality, they are just at the beginning of a potentially arduous process if they intend to actually bring it to market and thus create value to their company and society. In the module *Determining Market Risks*, the students are introduced to a variety of risks that are involved with bringing a new product to market.

Financing a Business: The module *Financing a Business* guides students through the process of identifying business financing requirements, matching funding methods to requirements, and implementing a plan to secure financing. Entrepreneurial engineers use their curiosity to identify unfulfilled market requirements, connect and create meaningful opportunities with innovative solutions to the requirements, and create valuable businesses. Pursuing an efficient method for financing a business is essential to monetizing an opportunity, and returning value to customer, investor, and employee stakeholders.

Generating New Ideas Based on Societal Needs and Business Opportunities: The module *Generating New Ideas Based on Societal Needs and Business Opportunities* introduces students to a number of methods that can lead to new business ventures, including recognizing societal trends and market gaps and discovering different ways to solve.

Innovating to Solve Problems Under Organizational Constraints: Technical companies continually seek innovative employees in order to maintain a competitive edge and to keep their products relevant in the market. Hence the innovation skillset is highly valued by hiring managers, and the skills that breed innovation must be acquired by engineering students. Specifically, engineering students must be able to implement a methodical approach to innovation so that they can continually add value to their organizations. Furthermore, this innovation must occur within given boundary conditions and constraints to be adopted by the organization. The module *Innovating to Solve Problems Under Organizational Constraints* introduces students to different types of innovation and problem solving techniques in order to create a portfolio of practical solutions.

Innovative Client-Centered Solutions Through Design Thinking: Design thinking is an innovation mindset and a problem-solving methodology that helps people solve concrete challenges. In the module *Innovative Client-Centered Solutions Through Design Thinking*, students are guided through two human-centered design thinking (HCDT) cycles, and learn how to apply design-thinking skills to a client-centered challenge.

Learning from Failure: Failure is inevitable in life. Engineers must learn the difference between business failure and engineering failure; learn when it is acceptable to take risks; learn to recognize the signs of impending failure and how to avoid it; know how to examine past failures, personal and corporate, in order to learn lessons from those failures; and learn how to persist through failure. The module *Learning from Failure* covers these items in three lessons: What is Failure?, Types and Phases of Failure, and Case Studies.

Resolving Ethical Issues: The module *Resolving Ethical Issues,* which is based on research coupled with engineering and business experience, defines ethics as a process and argues that the principal reason to behave ethically is that it engenders trust; uses case studies that illustrate how ethical dilemmas arise in engineering; how most engineers respond in keeping with the engineering's paramount responsibility of protecting public health, safety, and welfare; and how a small minority of engineers act irresponsibly; and provides descriptions of three very different and practical methods for resolving ethical issues.

Role of Product in Value Creation: The entrepreneurial mindset focuses on value creation, and the qualities and characteristics associated with identifying unexpected opportunities to create value. This is not a new concept, as throughout history many famous individuals devoted their lives to developing inventions, many of which create value. The module *Role of Product in Value Creation* helps the student to investigate the total product concept, one that introduces a contrarian view the student may not have thought about previously. As part of this concept it is important to keep in mind for whom the products are designed, the consumer. Finally, it is important to go beyond the product to better understand the concept of value.

The Elevator Pitch: Advocating for Your Good Ideas: As engineering professionals, graduates will be expected to present solutions to engineering problems and related opportunities in a clear and time efficient manner. The module *The Elevator Pitch: Advocating for Your Good Ideas* introduces students to the essential skill of advocating for themselves, their product, or their solution to various individuals. The module provides guidelines for preparing and delivering brief, effective pitches, anytime and anyplace, to a wide variety of decision makers.

Thinking Creatively to Drive Innovation: The module *Thinking Creatively to Drive Innovation* encourages students to stimulate and use their natural curiosity regarding the changing world about them and its needs. Then, based on what they see and understand, seek to make connections from many sources to generate creative ideas that lead to meeting those needs. Thinking creatively requires understanding that creativity is determined more by nurture than nature, recognition of the value of the divergent-convergent thinking process, forming highly diverse teams, and then using collaborative thinking methods.