Overview

With generous support from the Kern Family Foundation, Bucknell University is undertaking a sweeping reimagining of the design course opportunities offered to our engineering students. We are developing a number of new and restructured curricular and extracurricular offerings that promote an entrepreneurial mindset and prepare students for being exceptional contributors to future employers. The principal elements of this process are re-engineering our introductory course Exploring Engineering, creating a new set of courses around the theme of IDEAS (Innovation, Design, Entrepreneurship, Application, and Systems), offering a regular series of entrepreneurially minded extracurricular competitions, and ongoing efforts to introduce more faculty to new opportunities for their courses. All of these elements will lead to the creation of a KEEN Entrepreneurially Minded Engineer certificate program.

On-boarding and Sustaining Faculty

Faculty buy-in is key to the success of the KEEN IDEAS program. During on-boarding workshops, faculty are introduced to entrepreneurial mindedness and its natural ties into the skills and attributes we desire to see in our students. At these workshops, both first-time and veteran participants leverage multi-disciplinary cross-pollination of ideas, strategies, and experiences. Such activities have already led to a number of tangible outcomes in courses at Bucknell. A few examples include:

Numerous current and future courses have benefited from the cooperative development of entrepreneurially-minded topics and practices, such as Senior Design in Mechanical Engineering, Biomedical Engineering, Chemical Engineering, Civil Engineering, and Computer Science, “Should We Start this Company”, IMPACT – Exploring Innovation, Fluid Mechanics, System Dynamics, Applied Food Science, and others.

• Linking an entrepreneurial mindset to a wide range of topics such as sustainability, ethics, leadership, public policy, and professional licensure.

Creating and Deploying IDEAS Studio Electives

Over the course of the next three academic years, Bucknell will develop 7 new courses that focus on fostering an entrepreneurial mindset in undergraduate engineering students. Five of these courses will be half-credit electives available to varying levels of students (freshmen/sophomore, junior/senior) and will all be linked to industrial partners who will not only provide industry relevant opportunities and problems to the courses, but will act bilaterally to identify common areas where students need to improve to become more effective entrepreneurially-minded and engaged. All courses will be hands-on and will result in the practical realization of prototypes. The entrepreneurial mindset will be infused in all courses and a progression of increasing skill level will be built into the courses. The courses will culminate with a year-long transdisciplinary senior design sequence. Course foci include: product archeology, realization through prototyping, navigating from concept to commercialization, design thinking, and principles of entrepreneurship. The outcomes of this program are:

• Develop curricular opportunities for students to grow as entrepreneurially-minded engineers who will excel at:
  - people management, project management, character development, design thinking, professional skills, technical skills.
  - Create a KEEN Entrepreneurially Minded Engineer certificate program for students who take multiple studio and Transdisciplinary Senior Design. Current discussions also include the possibility of creating a minor.
  - Creation of an Industrial Liaison staff position in the college to manage external partners and develop and implement fee structures for buy-in to projects and courses in Studios and Senior Design.

Disseminating our KEEN Winter Interdisciplinary Design Experience (K-WIDE)

K-WIDE was piloted in January 2012 to 23 first and second year engineering students who worked for 130 hours over 10 days to address the NAE Grand Challenge to Restore and Improve Urban Infrastructure. The program forces students out of their comfort zones to understand the complexity of design in a large global context. Participants worked their way through the problem by navigating a 5-50,000 ft paradigm where consideration of context, significance, purpose, and market relevance permeated the entire experience. The experience culminated in design-build-refine of the concepts. K-WIDE 2014 was offered during January 2014 and experiences were shared out with other KEEN schools.

• University of New Haven, Ohio Northern University, and Union College visited K-WIDE 2014 and began planning their own local offerings for January 2015.

• This project will be disseminated in detail at ASEE 2014, which will include assessment of objectives and articulation of how K-WIDE seeks to synthesize an entrepreneurial mindset and engineering design.