2012 Kern Fellows Program
Guidelines for Development of Technology Innovation Modules

Objectives: Kern Fellows are selected based on their demonstrated understanding and/or passion about the process of how to turn good ideas into products. We hope to leverage the Fellow's expertise to expose undergraduate engineering students to the principles of innovation and the entrepreneurial mindset within the context of their undergraduate engineering science courses. The idea is for student engineers to better internalize how to synthesize fundamental engineering principals with innovative thinking and problem solving associated with practical applications. Importantly, the intent is not necessarily to create an ambition to be an entrepreneur, but rather an "entrepreneurial mindset". The latter connotes a passion to identify challenging applications of engineering and an understanding of the multi-dimensional and often risk components of reaching a real solution. The solutions often include other kinds of team members and backgrounds that one needs to interface with to solve the problem.

Responsibilities: The main responsibility of a Kern Fellow is to develop a case-study-based, Technology Innovation Module, that demonstrates the process of moving technical innovation to market. The following are desirable attributes of the case study module:

- The innovation should involve technology relevant to the selected undergraduate course in which the module will be implemented. Ideally, it should build upon foundational concepts accessible by undergraduates. If understanding of advanced topics is needed, the technology should be framed in a way that motivates students to explore those concepts.
- The focus should be on the technology development, but introduce students to some of the entrepreneurial challenges associated with commercialization (financial, marketing, regulatory, organizational, teaming, etc.). This critical part of the module is what distinguishes it from other lecture discussions on technical advances in the relevant field (e.g., research advances in a Professor's lab). However, remember that the idea is to expose students to the business side of innovation and the entrepreneurial mindset, not to convince them that they should all be entrepreneurs.
- The module should be designed for implementation by any course instructor, to ensure sustainability in the future. Note that Kern Fellows can opt to present the case study in class themselves, but the idea is that the module be used for several years by different instructors.
- The presentation of the module in class should leverage technology & multi-media to best engage students. However, a simple presentation by a passionate and captivating speaker could be powerful and just as effective at meeting the objectives.
- A discussion or other activity should be included to engage students and promote understanding and retention. For example, students could be asked to form discussion groups to consider some aspect of the design or commercialization.
- The module should include pre-reading material, either in the form of handouts, and/or links to relevant on-line content.

Recommended Course Assignments: The course assignments listed in the table below were chosen based on the Fellow's background and/or relevant area of their technology innovation efforts. To assure a wide impact of the program, the chosen courses are required ones with large enrollments, and ones that covered all programs in the sophomore and junior years.

Faculty Fellow	Proposed Course	BE	CE	EE	ME
Selim Ünlü	EC 455 Introduction to Electromagnetics		Ju	Ju	
Mark Horenstein	EK 307 Electric Circuit Theory	So	So	So	So
Ari Trachtenberg	EC 327 Introduction to Software Engineering		So		
Christos Cassandras	EC 401 Signals and Systems		Ju	Ju	
Thomas Bifano	ME 306 Material Science				Ju
Dan Cole	ME 310 Instrumentation and Theory of Experiments				Se
Ted deWinter	ME 419 Heat Transfer				Ju
Sean Andersson	EK 301 Mechanics	So	So	So	So
Michael Gevelber	ME 304 Thermodynamics				Ju
Ed Damiano	EC 402 Control Systems ME 404 Dynamics and Control of Mechanical Systems			Ju	Se
Joyce Wong	BE 420 Solid Biomechanics	Ju			
Jim Collins	BE 402 Control Systems in Biomedical Engineering	Ju			
Mark Grinstaff	BE 209 Principles of Molecular Cell Biology and Biotechnology	So			
Irving Bigio	BE 401 Signals and Systems in Biomedical Engineering	Ju			
Catherine Klapperich	EK 424 Thermodynamics and Statistical Mechanics	Ju			

Deliverables/Timeline:

Abstract (March 27): The abstract should summarize the proposed module development, including the following:

- A short description of the technology innovation that will be described, including the core concepts of the relevant course that are covered in the technical aspect of the innovation.
- The aspects of commercialization/ entrepreneurial mindset that will be addressed, including why these aspects may be particularly relevant for this innovation.
- The proposed structure of the module; lecture, videos, class activities.
- A list of tasks needed to develop the module with a timeline

Completed Module (June 1): The final deliverable will be a completed module and all of the associated materials. Specifically, the following items should be in the final packet:

- Abstract, updated as needed to reflect any changes.
- Case description—details to be provided later.
- Lecture materials, including slides, videos, lecture notes, reading materials, list of relevant links.
- Any notes for the instructor regarding implementation of the module in class: e.g., timing of discussion or activities, possible discussion points, etc.

Resources:

A blog will be set up to allow Kern Fellows to share ideas and experiences in developing the case studies. We will include some DCN faculty to provide best practices from their experiences.

The KEEN (Kern Entrepreneurial Education Network) website includes case studies posted by faculty at other schools. Some of these may be helpful in demonstrating how the entrepreneurial aspects of innovations are covered. http://www.keennetwork.com/ . User names and passwords will be created for you.