Incorporating innovation and entrepreneurship in Biomedical Engineering Education

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Introduction

• BME undergraduate and graduate programs have evolved including new courses, new modules, new concepts,..
• To meet accreditation requirements requiring continual improvement
• Most important: Market Demands
• New diagnostic, therapeutic, rehabilitation and planning devices
• Health IT, e-health, m-health, Medical Informatics, Nanomedicine, Tissue Engineering, ...
• Education and Curriculum design also require changes
• One recommendation made: Include Internship in BME programs

• How to motivate students in innovation and entrepreneurship?
Objective

• To incorporate Innovation and Entrepreneurship in the Biomedical Engineering Curriculum Design
Models with Innovation and Entrepreneurship

- A few universities have considered combining Biomedical Engineering programs with existing Engineering Innovation Centers
- Some programs have included the topics of innovation and entrepreneurship in graduate programs
- Post-graduate level certificate program
- Graduate level BME programs (by course work and projects)
- A few examples
Purdue - BIOMEDSHIP

• Gain insight into the processes necessary for taking medical technology from design to implementation and commercialization
• A new wave of business-savvy researchers
• A new generation of business leaders well-versed in biomedical technology
• A new way of doing business
• Students will undertake two focused courses in biomedical entrepreneurship and innovation, and will receive a designated certificate of achievement upon successful completion.
  • MGMT 590E: Biomedical Entrepreneurs Thought Leaders Workshop.
  • MGMT 590F: Biomedical Entrepreneurship & Innovation Practicum.
• Enabling students to produce an outstanding business plan or a commercialization plan around a medical device need in the marketplace.
Introduction to BIOMEDSHIP

• **BIOMEDSHIP** is a focused educational program at Purdue University
• Provides training in innovation and entrepreneurship in biomedical technology and the medical device industry.
• Designed to provide students with the skills essential for the early development and management of new biomedical technologies.
• Enhances students’ abilities to identify new opportunities for innovation, assess clinical and market potential.
Phase I
Evaluation and Development of Concepts

- A set of needs are presented to the students for consideration as the basis for a commercialization plan.
- Students work in teams to identify and evaluate the most promising need.
- Iterative process that includes suggesting, discarding, resurrecting, and reconfiguring concepts.
- By mid-semester, students will have chosen several new concepts to be carried forward to actual development.
- Sorting and prioritizing will involve extensive input from faculty coaches, mentors, and expert panelists who witness student presentations.
Phase II  
Refining the Concepts

- This is the planning & implementation stage.
- Students characterize real clinical needs and develop concepts to solve them.
- The students will identify the best business model to take the ideas forward.
- This may take the form of a new research program, a licensing strategy, further incubation, or the creation of a new start-up company.
- Students will create a business plan or commercialization plan around their business model.
- Once again, this process is facilitated by extensive input from faculty coaches, mentors, and expert panelists who witness the presentation of the business plan.
Cincinnati

• Advances existing and creates new intellectual property for commercialization by partnering physician innovators with multi-disciplinary teams.
• Students from School of Design, Biomedical Engineering and Business supported by faculty and facilities.
• Students collectively learn about the unique requirements of developing medical products in a highly regulated environment.
Stanford – BME iDEA

- Innovation, Design and Entrepreneurship Alliance
- Professors with common interest
- Conferences on iDEA themes
- Multi-disciplinary collaboration
Medical Device Entrepreneurship Association:
- Education – to provide educational structures to help undergraduate and graduate students engage in the medical device company development process
- Networking – to provide a suitable networking environment for student medical device entrepreneurs
- Mentorship – to provide support and mentorship to students wishing to pursue medical device entrepreneurial ventures
- Inquiry – to host discussions that address novel issues relating to philosophy and ethics within the scope of medical device entrepreneurship
- Professional Development – to collaborate with other universities (i.e. Emory University, Georgia State) to expand opportunities pertaining to medical device entrepreneurship to Georgia Tech undergraduate and graduate students
Results and Discussion

- Existing programs are relatively new
- Long term results will help define the inclusion in graduate programs
- Difficult to include in undergraduate programs
- Possible to include in coop/internship modules if the training is in start-up companies
Conclusion

- Continual improvement of program necessary in all programs, especially in Biomedical Engineering programs
- Accreditation agencies prefer innovations
- Good for selected students, academics, universities, business.
- Keep innovating !!