INNOVATION ACROSS CAMPUS: AN INTERDISCIPLINARY APPROACH TO ENTREPRENEURSHIP EDUCATION AT ILLINOIS INSTITUTE OF TECHNOLOGY (IIT)

Jianwen Liao  
Illinois Institute of Technology  
Stuart School of Business  
3424 S. State Street,  
IGT-Central Rm. 4A8-2  
Chicago, IL 60616  
312-567-3895; liao@iit.edu

David Pistrui  
Illinois Institute of Technology

Thomas Jacobius  
Illinois Institute of Technology
ACADEMIC ABSTRACT

The Entrepreneurial Interprofessional Project (EnPRO®) Program at the Illinois Institute of Technology furthers students’ knowledge of entrepreneurship through hands-on experience in an interdisciplinary team setting. It provides students with the opportunity to tackle the risks and challenges of starting their own business ventures. Working in multidisciplinary teams, students brainstorm, mine faculty research for commercialization ideas, or work on company or entrepreneur-sponsored ideas to assess opportunities and validate ideas, develop and demonstrate prototypes, identify target markets, and create business plans that are subsequently evaluated by a panel of academic and industry professionals during a formal competition.

EXECUTIVE SUMMARY

Program Description and Objectives

The EnPRO® Program prepares students for the practical entrepreneurial challenges they will face in a startup or established corporate environment. Cross-functional student teams from various disciplines are presented with a wide range of business opportunities and undergo a semester-long entrepreneurial journey. Through two EnPRO courses, students can develop a unique portfolio of entrepreneurial experiences that include opportunity assessment and validation, prototyping, marketing research, and business plan development. Additionally, the activities, deliverables, and assignments, as well as the grading and assessment requirements, develop in students the type of project competencies, cross-functional collaboration experience, team processes, and peer evaluation methods that reflect professional practice. Specifically, IIT’s EnPRO program is designed to achieve two broad ranges of objectives at both the student and institution level.

At the student level, EnPRO is aimed to:

- Equip students with a set of entrepreneurial skills that are both applicable in a startup environment as well in established organizations.
- Develop students’ skill sets in teamwork, leadership, project management and communication in a multidisciplinary team-based learning environment.
- Raise students’ awareness in making entrepreneurship as a career choice.

At the institution level, EnPRO is aimed to:

- Foster an entrepreneurial mindset and innovative spirit across the IIT campus.
- Provide focused thought leadership and core resources to advance entrepreneurship initiatives as part of the strategic development of IIT and the community it serves.
- Develop a coordinated science and technology entrepreneurship program for science and engineering students, community outreach, and business formation at IIT.
- Develop a sustainable, world-class entrepreneurship and innovation initiative targeted at addressing unmet needs and opportunities for science and technology education and socioeconomic development across the region at large.
INTRODUCTION

Program Structure

The EnPRO program at IIT provides student entrepreneurs with the opportunity to tackle the risks and challenges of starting their own business ventures. Working in multidisciplinary teams, students brainstorm, mine faculty research for commercialization ideas, or work on company or entrepreneur-sponsored ideas to develop and demonstrate prototypes, identify target markets, and create business plans that are subsequently evaluated by a panel of academic and industry professionals during a formal competition. The best ideas may even attract seed funding that jump-starts new ventures. The structure is highlighted in the Figure 1 which includes components such as opportunity identification and assessment, student team assignment, faculty advising, milestone-driven student assessment, and EnPRO presentation and exhibition.

Opportunity Identification and Assessment

On an ongoing basis, proposals for EnPRO projects are solicited from students, entrepreneurs, professors, companies and investors. All the proposals are evaluated based on potentials for commercialization. A proposal request form is provided in.
Exhibit A. A sample of selected EnPRO projects for the Spring 2007 semester is provided in Exhibit B. Since its inception in 1996, IIT’s EnPRO program has received support from a wide range of sponsors.

**Student Team Formation**

Each EnPRO course is organized as a team of 5-15 students from all academic levels (sophomore through graduate school) and professional programs (engineering, science, business, law, psychology, design and architecture). All projects are designed with goals that can be completed in one semester. However, depending on the level of project complexity, EnPRO projects can vary from one semester to multiple semesters with continuing areas of investigation. No two semesters are ever alike. To maintain project continuity and coherency, the project advisor(s) remain the same for the duration of the projects.

As an IIT general education requirement, all undergraduates must complete at least two 3-credit interprofessional/EnPRO courses. Graduate students are encouraged to enroll in EnPRO project courses as well, and they may receive elective credit for them.

**Faculty Specialists**

There are usually two faculty specialists involved in advising student teams. The first one generally has a technical background related to the project and helps students tackle technical and design issues that arise. The other faculty specialist has business background and helps students with the business issues surrounding the creation of a new venture.

Each project team typically meets with its faculty specialists twice per week. During the meeting, students will report the progress they made each week, raise any questions they have, and formulate action plans for the following weeks.

**Online Team Communication Tools: iGroup**

The iGROUPS system ([http://igroups.iit.edu/](http://igroups.iit.edu/)) is a project management tool designed to support all communication, scheduling and collaboration activities of EnPRO teams. Through the use of iGROUPS, team members can send/receive e-mail messages, store/retrieve files, access/update a team calendar, and view a complete history of a team's activities since the creation of the team in iGROUPS. Exhibit C provides a sample of iGroup site.

**Online Knowledge Management Tool: iKnow**

The iKNOW online knowledge management system ([http://iknow.iit.edu](http://iknow.iit.edu)) is designed to preserve all important files and documents from previous IPRO Team projects and make these "nuggets of information" available for later use. Through iKNOW, teams will have access to tens of thousands of designs, programs, reports, drawings, photos, slides and reflections that record all the work of hundreds of previous EnPRO teams. The experts used, the processes executed, and the information generated by EnPRO teams are all available. Exhibit D provides a sample of iKnow site.
Interprofessional EnPRO Projects Conference

The Interprofessional Projects Conference, or IPRO/EnPRO Day, is the most prominent activity associated with EnPRO course projects each semester. IPRO/EnPRO Day provides EnPRO teams the opportunity to share their project accomplishments via formal presentations and exhibits with company sponsors, investors, professors and other parties from university and business community. A sample of the IPRO/EnPRO Day program is provided in Exhibit E. Table 1 presents an historical overview of the total number of student participants and projects to date.

### TABLE 1

Histogram of IPRO/EnPRO Projects Between 1995 - 2006

<table>
<thead>
<tr>
<th>Year</th>
<th>Projects</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995-96</td>
<td>539+</td>
<td>4,500+</td>
</tr>
<tr>
<td>1996-97</td>
<td>539+</td>
<td>4,500+</td>
</tr>
<tr>
<td>1997-98</td>
<td>539+</td>
<td>4,500+</td>
</tr>
<tr>
<td>1998-99</td>
<td>539+</td>
<td>4,500+</td>
</tr>
<tr>
<td>1999-00</td>
<td>539+</td>
<td>4,500+</td>
</tr>
<tr>
<td>2000-01</td>
<td>539+</td>
<td>4,500+</td>
</tr>
<tr>
<td>2001-02</td>
<td>539+</td>
<td>4,500+</td>
</tr>
<tr>
<td>2002-03</td>
<td>539+</td>
<td>4,500+</td>
</tr>
<tr>
<td>2003-04</td>
<td>539+</td>
<td>4,500+</td>
</tr>
<tr>
<td>2004-05</td>
<td>539+</td>
<td>4,500+</td>
</tr>
<tr>
<td>2005-06</td>
<td>539+</td>
<td>4,500+</td>
</tr>
<tr>
<td>2006-07</td>
<td>539+</td>
<td>4,500+</td>
</tr>
</tbody>
</table>

For each IPRO Day, there are typically 80 to 100 evaluators from academics and industry who participate in judging the quality of the EnPRO team presentations and exhibits. The top three projects are recognized and awarded.

### Uniqueness of the EnPRO Program at IIT

1) It provides students with a real life project and hands-on experience in an entrepreneurial setting.
2) It is cross disciplinary and reflects a real world work environment.
3) It is result-focused culminating with a presentation to a panel of industry experts, entrepreneurs and business professionals.
4) It is skill-based with an emphasis on a) Opportunity Recognition, b) Problem Solving, c) Value Creation, d) Defining Markets, and e) Understanding Customers.
EXHIBIT A

INTERPROFESSIONAL PROJECT (IPRO/EnPRO)
PROPOSAL REQUEST FORM

I. Lead and Consulting Faculty

II. IPRO Project Title

III. Sponsor or External Collaborating Organization (if any)

IV. Description of Project (Including Project Course Structure and Preliminary Plan)
   In two pages or less, please give attention to the following, as a minimum: (a) contemporary significance of the problem or opportunity, (b) team purpose and goals, (c) major activities and tasks, (d) planning as a multi-semester phased project (if appropriate), (e) potential for achieving interprofessional learning objectives, (f) potential for immediate or long-term external collaboration or sponsorship, and (g) potential for rigorous application of at least two accepted research, design, business or other types of methodologies associated with professional practice.

V. Section Size Limit
   Minimum size is 7, maximum size is 15 students.
   ☐ 10 students (default section size)
   ☐ _____ students (please specify size limit)

VI. Appropriate Disciplines
   Check the lines below to specify the individual disciplines appropriate to the project, and indicate any limit on number of students from a major (default number of students from one discipline is 50% of team size)

---

1 The learning objectives are achieved through IPRO course sections that represent unique open-ended, complex projects that offer each student the opportunity to apply discipline-specific knowledge and methodologies in the context of: multidisciplinary teamwork, project management, communication, real-world problem solving (including ethical and other non-technical considerations), and resourcefulness and diligence in gaining new knowledge or skills (i.e., good lifelong learning practices). An Entrepreneurial IPRO has the added learning objective of applying business planning principles.
VII. Collaboration
Describe plans or potential for collaboration with faculty members from other colleges or professional programs that strengthens the interprofessional experience.

VIII. Request designation as an Entrepreneurial IPRO (EnPRO)
Add team requirement of a business plan.
- Yes
- No
- Uncertain…tell me more

IX. Class Days/Times
- Tuesdays/Thursdays 3:15 to 4:30 (most typical due to reduced conflict with other courses)
- Tuesdays/Thursdays 5:00 to 6:15
- Mondays/Wednesdays 3:15 to 4:30
- Mondays/Wednesdays 5:00 to 6:15
- Other: _______________________

All disciplines are welcome

Architecture  Professional Development
Business  Psychology
Design  Science & Letters
Engineering
- aerospace engineering
- architectural engineering
- biomedical engineering
- chemical engineering
- civil engineering
- computer engineering
- electrical engineering
- engineering management
- materials science/engineering
- mechanical engineering

Law
X. Location

Building/Room:
- I request the following building/classroom from the Registrar: _______________
- I will accept any Registrar classroom assignment
- I will use the following conference or other room: _______________

Campus:
- Main Campus
- Rice Campus
- Main Campus via Interactive TV with Rice Campus
- Downtown Campus
- 350 North La Salle Campus

XI. Critical Budget Needs

Most projects do not require a budget.

XI. Faculty Qualifications

If you have not previously been an instructor for an IPRO/EnPRO course section, briefly (a) explain why you are motivated and feel qualified to coach/mentor a multidisciplinary open-ended problem solving team, (b) cite relevant experiences and accomplishments, and (c) share your views on the key factors for team success. (Please limit your response to one page.)

XII. Student-Initiated Proposals

Students may initiate an IPRO/EnPRO Project Proposal using this form; however, the designated faculty member(s) who have committed to serving as the instructor must submit all student-initiated proposals to the Interprofessional Program Office. The student(s) initiating the IPRO/EnPRO Project Proposal should be listed below by name, major, level and e-mail address. Additional information or justification that supports the proposal may be attached (limit your response to one page please.)
EXHIBIT B
Sample of EnPro projects

Spring 2007
EnPRO Classes at IIT

Plug-in Hybrid Electric Vehicle (PHEV)
Faculty: Sonalika Wiroshinga (ECE) and Ali Emadi (ECE) in consultation with James Bradband, Senior EnPRO Lecturer (SSB)
Appropriate Disciplines: Students from all disciplines are welcome to join this EnPRO team.
Description: The Plug-in Hybrid Electric Vehicle (PHEV) is a hybrid car with an additional battery that has the ability to be recharged at home or anywhere an electrical outlet exists. Team members will become familiar with the fundamentals of plug-in hybrid technology and business plan development. The spring semester will follow through on the work of the Fall 2006 team to develop a cash flow analysis and other information that supports a comprehensive business plan.
This technology is extremely new with a lot of key players entering and leaving the arena everyday, therefore, it will be vital to update the business plan/models accordingly. It is also expected that there will be a finalized product at IIT and this will play a vital role in what is developed in the spring semester.

Sonar for Blind & Visually-Impaired Swimmers
Faculty: Daniel Ferguson, Senior EnPRO Lecturer (SSB) in collaboration with Professor Dave Volmer, Rose Hulman Institute of Technology
Appropriate Disciplines: Biomedical engineering, business, computer engineering, design, electrical engineering, materials engineering, mechanical engineering, psychology and others interested in contributing to the goals of this project.
Description: The purpose of this EnPRO project is to assess the feasibility, consider filing a patent application, and build a business plan for a product under development and testing by Rose Hulman engineering students.
In the initial semester of the Rose Hulman (senior design) project, a product that allows blind and visually-impaired people to swim in standard pools more easily was designed, documented, and a prototype was tested. It uses infrared (IR) to communicate between an underwater transmitter and a receiver secured on the swimmer, the receiver issues beeps via waterproof headphones to warn the swimmer of an approaching wall. After successfully building a working prototype, the Rose Hulman team has tested the transmitter and receiver to verify the system’s correct operation as required by the Rose Hulman Product Design Specification (PDS).
The IIT EnPRO team will assess the market feasibility for this product, do technical and market research, build a business plan, and potentially build and test a second prototype if students from the appropriate disciplines join this EnPRO team. Working with the blind communities of Chicago and Indiana, the team will evaluate the use and design of the product. Potentially, prototypes will be put in place for extended testing and a patent search and application will be made by the team on behalf of Rose Hulman and the students who have designed and created the product.

**gWay: Advanced Technology for Guided Tours**
Sponsor: Segway of Chicago
Faculty: Xiaohai Sun (CS) and Jim Braband (SSB)
Appropriate Disciplines: Architecture, business, computer engineering, computer information systems, computer science, design, electrical engineering, information technology, internet communication, journalism, manufacturing technology, materials engineering, mechanical engineering, professional and technical communication, and psychology.
Description: The EnPRO team will investigate the market potential for the myWay system, a self-guided tour system using Segways, and further develop its companion, gWay, a guided tour system, to form a whole new tour experience for users. The Spring 2007 team will focus on completion of the technical development of the gWay product, a new touring system using PDA, GPS and Bluetooth technologies to provide a guided tour system that streams audio so that the tour guide doesn’t have to yell to be heard.

The business effort undertaken during Spring 2007 will focus on identifying attractive niche markets for the myWay product and completing a thorough business analysis of the opportunity for gWay, which will include identification of desired functionality and required product features. It is hoped that a functional prototype of the gWay system can be field tested on a commercial tour by May 2007. A complete business plan will be prepared as well.