

Course Development Grant Proposal: Intellectual Property Generation and Protection

Introduction

The new course development effort supported by this grant will strengthen existing Marquette University curricular programs in a manner not previously attempted in the 100 year history of the institution. The “Intellectual Property Generation and Protection” course, jointly supported by the University’s College of Engineering and Law School, will bring together students from engineering and law disciplines to work with professionals in both fields to experience first-hand the roles and responsibilities involved in creating technology-based sustainable competitive advantage for innovative new products. The four specific curricular programs strengthened by this new course will be:

- Engineering Management Program - jointly offered by Marquette’s College of Engineering and Graduate School of Management,
- Intellectual Property and Technology Law Program – offered by Marquette’s Law School,
- Engineering Innovation Certificate Program - offered by Marquette’s College of Engineering,
- Clinical and Translational Research Program – offered by the Medical College of Wisconsin.

Creation of a multi-disciplinary real-world student team experience involving this set of curricular programs will provide a unique opportunity to enhance the student learning experience in an area critical to innovation and entrepreneurship.

Problem

Innovation and entrepreneurship are key drivers to thriving local and global economies. Intellectual property generation and protection are essential to innovators and entrepreneurs seeking competitive advantage for their new products, processes, and services.

Inventors tend to focus primarily on the task of invention – generating new approaches to adding value for customers. But this, of course, is only part of the battle. It is essential for innovators and entrepreneurs to consider how to create *sustainable* competitive advantage from the *start* of the invention process. IP generation and protection play an important role in achieving this goal.

Innovators and entrepreneurs often encounter a variety of problems in generating and protecting IP, including:

- Disguised IP – Where exactly is the source of sustainable competitive advantage in my new product?
- Weak IP – Great new approach, but poorly documented. What did we invent?
- IP scramble – Writing invention disclosures the night and early morning before visiting a customer.
- IP burden – Excessive time/paper/cost required to generate and maintain IP.

These problems stem from a number of root causes, two of which are directly addressed by the course proposed here:

- Lack of awareness of the nature and importance of IP from the start of the innovation process.
- Lack of understanding of the roles and responsibilities of technologists and patent attorneys - the parties primarily involved in IP generation and protection.

The result of these problems is the waste of time and money on last-minute throw-it-over-the-wall patent applications which do not adequately protect the inventor’s IP.

Solution

The purpose of this course is to provide students with first-hand experience working on teams involved in new technology development. Two-person student teams consisting of one student from the Law School and one student from the College of Engineering or the Medical College of Wisconsin will be embedded in a technology development team, with the primary role of the student team being facilitation of patent application preparation.

As designated project team *IP facilitators*¹, students will obtain first-hand experience in identification and documentation of IP as an integral part of technology development. Just as importantly, this course will provide law and engineering students with direct exposure to the execution of their *counterpart's* roles and responsibilities in the generation and protection of IP. The purpose for creating these experiences is to generate an expanded IP mindset in the students which will result in improving the rate, volume, and efficiency of their future IP generation and protection efforts.

The student team activities will be supported by course lectures and activities designed to prepare students for their role as IP facilitator. General learning goals of this element of the course will include:

- Technology assessment – students demonstrate the ability to identify:
 - Primary problem being solved a technology,
 - Current and/or alternative solutions to the problem,
 - Specific benefits of proposed solution,
- IP prosecution – students demonstrate the ability to document the following in patent format:
 - Results of technology assessment,
 - Patent claims.
- IP litigation – students demonstrate the ability to:
 - Explain a patent to a judge and jury,
 - Testify as an expert witness in a patent litigation action.

History

Marquette University's Law School is one of two law schools in the state of Wisconsin. The School's Intellectual Property and Technology Law Program fosters a rich learning environment dedicated to understanding intellectual property and technology law (<http://law.marquette.edu/cgi-bin/site.pl?2130&pageID=156>). The program is anchored by students who are committed to becoming intellectual property lawyers. Students currently choose from over 15 different courses in the program, permitting them to develop course sequences tailored to their individual interests. Students also gain valuable skills through their participation in the Intellectual Property Law Review, moot court competitions and the Intellectual Property Law Society. The course proposed here adds a unique element to this program by providing students with direct contact with innovators and entrepreneurs involved in the generation of intellectual property.

¹ The student team role is specified as "IP facilitator", since law students are not allowed to practice law, and preparation of a patent application could be construed as practicing law. Applications facilitated by the student teams will be for provisional or regular patents, as conditions dictate. Responsibility and costs for submitting applications will lie with the technology development team, not the student team.

The Engineering Management Program (ENMA) is fifteen years old. A significant effort to increase the size and impact of this program was initiated in 2005. The result has been a three-fold increase in program enrollment and ENMA course enrollment (see Appendix 1 for a summary of the ENMA program). These results were achieved through four actions (in this order):

1. Program faculty enhancements (including hire of this PI),
2. Pro-active recruitment of students,
3. Integration of industry-sponsored student projects into program courses,
4. Extensive program curriculum expansion and improvements.

Development of the course proposed here represents the final element in the program curriculum improvement strategy for this program². ENMA curriculum improvements are based on extensive interviews with local industry leaders, as noted in Appendix 2. This input is critical to this proposal, since local industry represents a potential source of IP-related projects for student teams to work on.

In September 2008, the College of Engineering added a new program that benefits from the development of the proposed course. The College's Engineering Innovation Certificate prepares engineers to pursue technically and commercially viable new technology-based products, processes, and services. The New Product and Process Development Certificate enhances capabilities of engineers and engineering managers to bring these new opportunities to market in a timely and efficient manner. In essence, the Engineering Innovation Certificate supports *doing the right things*, and the New Product Development Certificate supports *doing things right*. The course proposed here will be a core course for the Engineering Innovation Certificate (see: www.mu.edu/enmacertificates for certificate curriculum).

Another program that will benefit from the development of this course is the new Clinical and Translational Research Program offered by the Medical College of Wisconsin. The proposed course is planned to be cross-listed in this program. The Medical College of Wisconsin and Marquette University work closely on a wide range of research and educational activities, including the Clinical and Translational Science Institute (see ctsi.mcw.edu).

Work Plan

The primary deliverables for this effort include the following, to be developed in the order shown:

1. On-line course syllabus providing student access to all course-related materials, and integrated with existing ENMA program course web sites (web site has been initiated, see www.mu.edu/enma289),
2. Course lectures and assignments for Technology Assessment, Patent Prosecution, and Patent Litigation course elements, prepared as PPT presentations for "live" classroom delivery,
3. Team project deliverable templates supporting sequential preparation of materials to be integrated into a team's patent application,
4. Project web site providing the extended project team (students plus sponsors and technology developers) with access to all project materials and results,
5. Course lectures as PPT presentations augmented with audio and video media for "virtual" delivery based on the D2L platform currently used at the University for on-line courses.
6. Final report in a format suitable for publication and presentation at an international conference.

² A key course in the ENMA program curriculum expansion effort, "Engineering Innovation and Entrepreneurship", was developed in 2005 through an NCIIA course development grant.

Preparation of these deliverables will be augmented by the following course development activities:

1. Identify and examine similar offerings and best practices at other institutions,
2. Prototype preliminary versions of live courses at Marquette and other institutions,
3. Prototype preliminary version of on-line courses at Marquette and other institutions,
4. Present approach and results at an international conference.

See Appendix 3 for a Gantt chart of this work plan, and Appendix 4 for the related project budget. The primary responsibility for executing the work plan will lie with the PI, with input from Kali Murray, Assistant Professor of Law, and other Law School faculty as required. Law School resources will be augmented with support from local law firms.

Upon completion of this effort, faculty resources required to support delivery of this course include: ¼ College of Engineering faculty to support the Technology Assessment element of the course; ¼ Law School faculty to support the Patent Prosecution element; ¼ Law School faculty to support the Patent Litigation element; ¼ College of Engineering faculty for project and sponsor identification and general course administration. Existing University resources will be applied to support the course.

Sustainability Plan

Sustainability of the proposed course depends on two factors: a continuous flow of students, and a continuous flow of projects. As cited above, both the College of Engineering's Engineering Management Program and the Law School's Intellectual Property and Technology Law Specialty are well-established programs with strong enrollment. Regarding the need for a steady supply of student team projects for the proposed course, five primary sources exist:

ENMA course projects: The College of Engineering offers a number of courses specifically designed to support the ENMA program (see Appendix 1). All ENMA courses are project-oriented, and these projects provide a potential source of concurrent or follow-on projects for the proposed course. Generally, ENMA course projects are sponsored by local industry, with additional projects coming from University research groups (see www.mu.edu/enmaprojects/f08 for an overview of Fall 2008 ENMA projects). As a specific example, a primary deliverable for student team projects in the ENMA 291 Engineering Innovation and Entrepreneurship course is a *technology commercialization prospectus*, in which student teams develop a commercialization plan for an emerging technology. Projects from this and other ENMA courses would dovetail well with IP-related projects of the proposed course.

Senior design projects: All College of Engineering seniors are required to take a two-semester Senior Design course which includes the design and prototyping of a product. Over forty senior design projects are executed each year. These projects could benefit from second semester co-projects focused on IP generation and protection. Senior design projects are strong candidates for NCIIA E-Team and BMEideas projects. It is anticipated that coupling IP facilitator teams from the proposed course with senior design teams would stimulate proposals for these types of projects.

Medical College of Wisconsin: The Clinical and Translational Research Program at the Medical College of Wisconsin actively pursues a wide range of research with significant IP potential. This program is associated with the Clinical and Translational Science Institute, which includes members from Froedtert Hospital, the Children's Hospital of Wisconsin, the VA Medical Center, the Blood Research Institute, Marquette University, the University of Wisconsin-Milwaukee, and the Milwaukee School of Engineering. Linkage with this program provides a strong source of IP facilitator team projects.

Kohler Center for Entrepreneurship: The goal of this University-sponsored organization is to create for students and entrepreneurs within the Marquette community a positive orientation toward the art of the possible by helping each person acquire a personal collection of knowledge, experience and personal contacts (<http://www.mukohlercenter.org>). The center also sponsors an annual business plan

competition (<http://www.mukohlercenter.org/bplan/>). Linkages with this organization provide a good source of IP facilitator team projects.

Golden Angels Network: This organization provides opportunities for entrepreneurs to develop early financing for their enterprises through a closely knit network of Marquette alumni and friends (<http://www.goldenangelsnetwork.org>). The network also facilitates networking opportunities for groups of individuals with experience and interest in entrepreneurial endeavors. Linkages with this organization provide an additional source of IP facilitator team projects.

University invention disclosures: University invention disclosures (see Appendix 5) will be mined on a regular basis for potential projects.

In addition to these specific project sources, it is anticipated that patent attorneys assisting in the preparation and delivery of this course will identify additional potential projects. Finally, of course, contacts with research groups within the University will provide additional project opportunities.

Evaluation Plan

The immediate objective of the course proposed here is to prepare students to add value to technology development efforts as IP generation and protection facilitators. Two indicators that this objective is being met (criteria for success) are that the course:

- Attracts a steady stream of highly-motivated students,
- Attracts a steady stream of highly-motivated sponsors with meaningful inventions.

If this course is achieving these criteria for success, then positive trends in the following metrics would be expected:

- Number of patents filed per course offering (short term),
- Percent of student team projects that result in patent filings per course offering (short term),
- Proportion of regular patents filed to provisional patents filed per course offering (short term),
- Number of filed patents issued (long term),
- Backlog of projects to be worked on by student teams (long term).

Continuous improvement of courses will be pursued using the standard Marquette University course and instructor assessment tools. Until this academic year, Marquette used the Instructional Assessment System Form X from the University of Washington's Office of Educational Assessment (http://www.washington.edu/oea/pdfs/course_eval/FormX.pdf) for evaluating courses and instructors, and all ENMA courses have been assessed using this tool. The University is in the process of switching to an on-line assessment tool similar to what has been used in the past, but details have not yet been released. This tool will be used to evaluate the proposed course.

In addition to standard University assessment tools, a multidisciplinary team performance peer assessment tool has been developed for ENMA student team projects (see Appendix 6). This tool will be applied for the proposed course. Finally, a project sponsor customer satisfaction survey tool will be developed specifically for this course.

For an example of how various forms of course, instructor, and program evaluation are used for continuous improvement of the ENMA program, see www.mu.edu/enmainprovementactivities.