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ILLINOIS
UNIVERSITY OF ILLINOIS AT URBANA CHAMPAIGN

Proposal to the Senate Educational Policy Committee

Monday, September 8, 2008 (Latest revision: Monday April 13, 2009)

PROPOSAL TITLE: To establish a Master of Science degree program in Financial Engineering (or MS in FE) to be jointly administered by the Department of Finance in the College of Business and the Department of Industrial and Enterprise Systems Engineering (IESE) in the College of Engineering.

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BRIEF DESCRIPTION: The MS in FE will be a rigorous, three-semester (48-credit hour), lock-step, residential degree program with a summer internship opportunity. The program will be operated under the principle of a stand-alone budget entity whose ownership is evenly divided between two separate Departments (and their respective Colleges). The program will generate tuition and fee revenue sufficient in scale to pay for associated faculty cost and expense and all other direct and indirect costs.

The driving force to initiate this program is to satisfy the growing demand for professionals with significant technical/quantitative training in this explosive sub-area of finance related to advanced financial instruments.

Successful applicants will have a Bachelors degree with one year of calculus, one semester of linear algebra and differential equations, one semester of programming (preferably in C/C++), and one semester of probability and statistics. Knowledge of basic finance is helpful but not necessary. Given the program's technical emphasis, most of the successful applicants will have completed a Bachelors degree in an engineering field, mathematics, physics, computer science or economics. The program expects that interested students with strong background but with minor deficiencies in some of the prerequisites may occasionally be admissible upon completion of some remedial courses.

Oversight of the curriculum will be provided by a joint faculty advisory committee composed of two faculty members from each sponsoring Department, who will be selected by the respective department Chair and Head. This committee, together with the Chair and Head of the two respective departments and a representative from the Dean's office of each of the two Colleges, will constitute an eight-member faculty advisory committee responsible for oversight of the degree and its curriculum. Curricular changes will come from this committee for review by appropriate channels in both Departments and Colleges before being forwarded to the campus for approval.

The curriculum will be drawn from four core areas of study: finance, stochastic modeling, computing and computational methods, and an applied practicum experience. The core will be supplemented with electives offered in the sponsoring Colleges and Departments and approved by the joint faculty advisory committee. All required courses will be offered by the two sponsoring departments; there is no dependency on courses from other departments. The proposed curriculum is summarized in Appendix A.

This degree, while technical in nature, is intended to be pragmatic such that it prepares students to be well-grounded and well-equipped to advance quickly in this field. To preserve this unique, cultural attitude, the program will have several important design elements. First, program operations will be managed by an Executive Director who will also serve as the Director of Graduate Studies for the program and a direct liaison to industry. Such relationships will lead to programmatic learning opportunities and will also assure the curriculum is both demanding and contemporary. Further, one course in the curriculum is designed as a "Practicum." The Executive Director will assist in helping serve as a bridge with industry to identify and maintain these "real-world" financial modeling problems.

The MS in FE will have an advisory board composed of practitioners with rotating terms. The board will be managed by the Executive Director and its mission will include: providing curricular and professional advice, being a source for summer internships, offering full-time employment opportunities, and assisting with development activities.

JUSTIFICATION: Financial Engineering (FE) is a relatively young, multidisciplinary field that pertains to the application of engineering approaches and methods to the analysis and management of financial problems, particularly in the financial asset arena. Common problems involve identifying and managing financial risk in asset portfolios

and the pricing of financial derivatives. Other applications exist in proprietary security trading operations, as well as all domains where risk is an important concern.

The field has emerged as the result of the ever growing complexity required in describing and solving these advanced business problems whose resolution requires fundamental economic principles and finance theory coupled with state-of-the-art mathematical methods, computational tools, and computer programming expertise. Within a short span of only two decades, FE has become a flourishing subfield characterized by its practical importance and deep intellectual value; indeed, several recent Nobel prizes in economics were awarded for works that have become the foundation of this field. Active research in finance, operations research, and mathematics is now being devoted to the study of many emerging issues associated with new financial instruments and other topics relating to risk assessment, risk measurement and optimization.

According to http://programs.gradschools.com/usa/financial_engineering.html, there are now 31 financial engineering or financial mathematics graduate programs in the U.S and many more international ones. This growth has been fueled by an active corporate community consisting of asset management companies (including mutual funds and hedge funds), insurance companies, and some advanced corporate treasury departments. Long-term trends in the financial services industry suggest a trend toward more quantitative analysis and methods.

In addition to quantitative finance, the same concepts can be applied to many other areas of engineering and business, including insurance, energy markets and commodity trading, financial services, business consulting, and government regulation. Lastly, the MSFE program also serves as an impetus for the two departments to develop a research focus in financial engineering that will enhance our research mission and doctoral programs.

BUDGETARY AND STAFF IMPLICATIONS

a. Additional staff and dollars needed

The present faculty members in both sponsoring departments have complementary expertise to cover all courses in the proposed curriculum (see attached course descriptions). On one hand, this program is a natural extension of the existing Master of Science in Finance (MSF) Program in the Finance Department, whose faculty can easily handle the core finance courses proposed here. On the other hand, the IESE Department has research and teaching expertise in computational finance, portfolio optimization, derivative pricing, stochastic calculus and computational methods. As the program develops, the two sponsoring departments plan to hire several additional tenured and tenure-track faculty in this area using resources generated from this degree program.

Aside from faculty, two types of staff support will be needed. One type involves an Executive Director and an Assistant Director. As mentioned elsewhere, the Executive Director will have deep familiarity with the needs of industry and will also serve as the Director of Graduate Studies. This person will also play a critical role in advising

students, maintaining corporate relationships, recruiting new students and overseeing student placements. The Director will have the responsibility for interacting with both faculty and students and maintaining overall satisfaction. The Director will also serve as a bridge between the leadership of the Finance and IESE Departments, however the Director will report to the joint faculty advisory committee.

A second layer of staff support will be needed in the area of clerical support. In the beginning, MSFE admissions will be administered by Finance and IESE personnel so that cost and production efficiencies can be realized. As the MSFE program grows and stabilizes, which we expect to happen after two to three years, it is expected that resources will be sufficient to expand this support as needed.

In the first two years of operation, the program will experience deficits and will be in need of seed funds. Such financial matters have been addressed between the two sponsoring departments and their respective colleges and with the Provost's Office; all units involved are committed to provide needed support to ensure the successful start of the program (see Appendices B1 and B2).

b. Internal reallocations

The MSFE joint faculty advisory committee will ensure that current student-teacher loads will not be significantly affected and that existing undergraduate and graduate programs will not be drawn down or adversely affected.

c. Effect on course enrollment in other departments

The program does not depend on courses offered through other departments; thus there will be no direct effect on course enrollment in other departments. Some students may be drawn to consider both the current MSF as well as this proposed program. Given this, the two programs will be managed in a cooperative way so as to not adversely affect operations of the MSF program.

d. Impact on the University Library

The program does not require additional library materials such as books, periodicals, etc.; thus, there will be no impact on the University Library; see Appendix C.

e. Impact on computer use, laboratory use, equipment, etc.

The program will supply students with computers, software and data sets funded through tuition and fees. There will be no negative impact on existing facilities, computer usage, laboratory usage or equipment.

DESIRED EFFECTIVE DATE: August 1, 2009

STATEMENT FOR PROGRAMS OF STUDY CATALOG: see Appendix D.

CLEARANCES:

Signatures:

Department of Finance Representative: _____ Date: Sept 9, 2008

Department of IESE Representative: _____ Date: Sept. 9, 2008

College of Business Representative: _____ Date: 9.9.08

College of Engineering Representative: _____ Date: 9/15/08

Graduate College Representative: _____ Date: 12/9/08

Provost Representative: _____ Date: _____

Educational Policy Committee Representative: _____ Date: _____

Full proposal available for review in the Senate Office.