



May 2011

## **DRAFT: M.S. in Computational Finance and Risk Management University of Washington Seattle**

### **Introduction**

University of Washington (UW) proposes to offer a Master of Science in Computational Finance and Risk Management beginning Summer 2011. This self-supporting program would be offered simultaneously at the Seattle campus and online, and it would mainly serve working professionals seeking to advance in or switch careers. The proposed program would be administered by the Department of Applied Mathematics and UW Educational Outreach, which collaboratively launched an online Computational Finance Certificate (CFC) program in 2010.

The proposed degree program would build on the CFC certificate program and may develop new ones. It would enroll 13 FTE students this summer, increasing to 30 FTE students in 2013. At that point, 18 students per year would graduate, prepared to apply computational approaches to investment and financial risk management decisions in positions such as investment officers, traders, research analysts, and financial risk managers.

### **Relationship to Institutional Role and Mission and the Strategic Master Plan for Higher Education in Washington**

The proposed program would support UW's knowledge dissemination mission by broadening the university's graduate degree offerings to include a new interdisciplinary field. Online delivery and part-time scheduling options would align with the *Strategic Master Plan for Higher Education* strategy of creating a system of support for lifelong learning.

### **Program Need**

Student demand for quantitative finance master's degrees has been high across the country. The proposal includes a table of 2006-2010 applications, admissions, and enrollments for nine quantitative finance master's degree programs in other states. Applications are significantly greater than enrollments, with 2010 enrollment/application ratios ranging from 5 to 20 percent. For example, University of California Berkeley's Master of Financial Engineering program received 333 applications and enrolled 67 students.

The department would leverage student demand by offering certificate programs in conjunction with the proposed degree. Despite only six weeks of marketing, the year-long online Computational Finance Certificate (OCFC) program enrolled 30 students, most of whom are working professionals.

A December 2010 survey indicates 10-13 OCFC students would apply to the proposed program. Along with the proposed MS degree, the department would offer two certificate programs, one in Computational Finance and one in Risk Management. These certificate programs would serve as terminal programs or as stepping stones to the MS degree.

The proposed program would respond to employer demand for STEM graduates who are in short supply, according to the state's employer needs assessment joint report.<sup>1</sup> The proposal includes letters of support from Microsoft Corporation's Worldwide Treasurer, Parametric's Chief Executive Officer, Russell Investments' Global Chief Investment Officer, and Blackrock Alternative Advisors' Chief Investment Officer. Although Pacific Lutheran University offers a B.S. in Financial Mathematics, no institution in Washington or the Northwest offers a comparable graduate degree.<sup>2</sup> Consequently, employers must hire from out of state.

The 2008-09 financial markets crisis underscores community demand for improved financial risk management, and the proposal includes letters of support from the Chartered Financial Analysts (CFA) Society of Seattle and the Global Association of Risk Professionals.

## **Diversity**

To enhance student diversity, the department intends to recruit from historically African American colleges and eventually create a scholarship fund to help recruit underrepresented students. It would also collaborate with the UW's state-funded Graduate Opportunities and Minority Achievement Program.

## **Program Description**

The proposed 40-quarter credit program would teach students modern quantitative finance methods and computational tools for making investment decisions and managing financial risk. Student learning outcomes would emphasize asset management, risk management, and computation. The curriculum would cover best practices and new methods designed to reduce investment risk and foster high risk-adjusted returns. Though its primary target audience is working professionals, the proposed program also would admit students without professional finance experience who have strong academic records in disciplines such as science, mathematics, engineering, finance, or economics.

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<sup>1</sup> Higher Education Coordinating Board, State Board for Community and Technical Colleges, and Workforce Training and Education Coordinating Board. *A Skilled and Educated Workforce: An assessment of the number and type of higher education and training credentials required to meet employer demand* (2009). Page 12.

<sup>2</sup> Washington State University has submitted a planning notice of intent to offer a Computational Financial Mathematics concentration within a Professional Science Master's degree statewide beginning Fall 2012.

After admission, students would complete at least 25 quarter-credits of foundational core courses, followed by at least 15 credits of elective coursework, which could include specialization pathways in Risk Management or Computing. All students would complete a final exam that would typically consist of a research presentation.

Students could complete the proposed program part-time in 2.5 years or full-time in 12-14 months. Most students would attend part-time, but a few (about five or six initially) would attend full-time in residence at the Seattle Campus. Lectures would be broadcast live and delivered online, but campus students would be able to attend the lectures face-to-face during broadcasts if they wished.

Courses would be taught by tenured/tenure-track faculty, non-tenure track faculty, and affiliate instructors (industry practitioners, including several from Russell Investments). Professors would be responsible for teaching about 60 percent of the program, including about 70 percent of required core credits. The remainder would be taught by affiliate instructors, who would be hired based on program planners' contact with and knowledge of the finance industry, rather than through competitive searches. Desired qualifications would include a Ph.D. (or an MS plus CFA status), extensive experience in the field, significant finance industry position, and prior teaching experience.

Both student learning and program assessment would use multiple measures. Student learning would be assessed through homework, exams, class participation, term computing projects, and a final exam that meets UW Graduate School requirements. Program assessment would employ entry and exit surveys, specialized quarterly online course evaluation surveys, alumni surveys, certification exam performance, analysis of competing programs, Quantnet rankings, and written feedback from an external advisory committee.

## **Program Costs**

The budget submitted with the proposal reports costs for the proposed degree program and its related certificate programs combined. Together, they would enroll 21 FTE (M.S. and certificate) students the first year, increasing to 46 FTE students at full enrollment during the third year. At full enrollment, the programs would require 3.4 FTE instructional faculty, 2.0 FTE guest lecturers, and 1.8 FTE administrative faculty and staff (including 0.4 FTE provided by the department Chair and .3 FTE by UW Educational Outreach). By the third year, the total cost of instruction, including indirect cost, would be \$1,386,108 (\$30,133 per average annual FTE student).

This lies within the graduate business program cost range reported in the HECB's *2005-06 Education Cost Study* (July 2007). A student enrolling in 2011 would pay \$33,000-\$35,000 to complete the program. According to program planners, this cost is comparable to that of other professional MS degrees at UW and at the low end of the cost range of quantitative finance degrees across the country.

## External Review

Two reviewers evaluated the proposal: Dr. John Lehoczky, Thomas Lord Professor of Statistics and Dean, College of Humanities and Social Sciences, Carnegie Mellon University; and Dr. John Moody, Chief Executive Officer, J E Moody & Company LLC. Both reviewers recommended approval of the proposal, noting particular strengths and offering specific suggestions. For example, both were concerned that a plan for placing graduates needed to be developed. Program planners responded that they have time to develop such a plan, which would leverage the program director's industry contacts.

Dr. Moody said the curriculum would “stand apart from most other programs” and would cover real-world work skills. Dr. Lehoczky said the program's combined emphasis on computation, asset management, and risk management “should distinguish it and make it relatively unique in a crowded field.” He recommended broadening the curriculum over time and cautioned that it would be important for faculty with teaching and research experience in computational finance to help their colleagues with less knowledge of the discipline. He also cautioned that UW would need to provide practitioner lecturers help with pedagogical matters (e.g. course planning, student learning, and student assessment). Program planners responded with plans to ensure sufficient faculty subject matter knowledge and practitioner quality.

## Staff Analysis

The department has an excellent national reputation, with its doctoral program tying Princeton University's Applied Mathematics doctoral program for first place in 2010 National Research Council rankings. The department has experience in offering online degree and certificate programs. The popularity of a computational finance certificate program suggests the proposed program would be a logical next step in departmental offerings.

The proposed program would support the *Strategic Master Plan for Higher Education* and UW's mission. In addition, it would respond to employer, student, and community demand at a reasonable cost without duplicating other programs. It would be the only graduate-level quantitative finance program in the Northwest, distinguishing itself from national peer programs through online delivery and a curricular focus emphasizing risk management and programming. Online delivery should appeal to both in- and out-of-state students. Furthermore, plans to leverage certificate programs should maximize student demand.

Students would study a curriculum focused on asset management, risk management, and computational methods. Both reviewers noted that this mix would distinguish the program from others in the field, and one noted it would impart “the skills needed for real-world work.”

The curriculum would be taught by a mix of academic faculty and practitioners. The practitioners would foster relationships with the Puget Sound business community that could be useful in terms of research projects, internships, or job placements for students. Student and program assessment would employ multiple measures.

The proposed program would benefit from increased diversity among its instructors. None of the 16 professors or affiliate professors named in the proposal are women, and only one is from a racial or ethnic group underrepresented in quantitative fields.

### **Staff Recommendation**

After careful review of the proposal and supporting materials, the staff recommends approval of the Master of Science in Computational Finance and Risk Management at the University of Washington. The HECB's Education Committee discussed the proposal during its April 26, 2011 meeting and recommended approval by the full Board.

**RESOLUTION NO. 11-07**

WHEREAS, University of Washington proposes to offer a Master of Science in Computational Finance and Risk Management; and

WHEREAS, The program would support the Strategic Master Plan for Higher Education, as well as the university's mission; and

WHEREAS, The program would respond to student, employer, and community demand without duplicating existing programs; and

WHEREAS, The program has support from external reviewers; and

WHEREAS, The program would be offered at a reasonable cost; and

WHEREAS, The program would be offered online as well as on-site at the University of Washington's Seattle campus;

THEREFORE, BE IT RESOLVED, That the Higher Education Coordinating Board approves the Master of Science in Computational Finance and Risk Management at the University of Washington effective May 19, 2011.

Adopted:

May 19, 2011

Attest:

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Earl Hale, Vice Chair

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Sam Smith, Member