

July 2009

DRAFT: Master of Science in Computing and Software Systems University of Washington Bothell

Introduction

The University of Washington Bothell (UWB) seeks approval to establish a Master of Science in Computing and Software Systems (MSCSS) degree program within UWB's Computing and Software Systems¹ unit, which now offers a Bachelor of Science in Computing and Software Systems (BSCSS) and a Bachelor of Arts in Applied Computing (BAAC). The proposed program would enroll 16 FTE in fall 2009, building to full enrollment of 45 FTE by 2011 with the capacity to graduate 29 students annually. Graduates would be prepared for careers in software engineering, systems analysis, computer programming, software project management, and related occupations.²

The MSCSS program was approved by HECB Resolution No. 03-07 on April 23, 2003, but the program was not implemented due to lack of state funding. According to HECB *Program and Approval Policies and Procedures*, programs not implemented within three years of their approval date are subject to further HECB review. Therefore, UWB has re-submitted its original proposal, along with a new needs assessment, comments from two external reviewers, and a revised budget based on self-support funding.

Program Need

The original proposal used data from a variety of sources to build a convincing case for student and employer need for the program. When UWB re-submitted the proposal in May 2009, it also submitted updated evidence of student and employer need. To obtain evidence of student need, the UWB submitted a survey soliciting interest in the program in May 2007. Forty-seven inquiries were received from potential students, including 24 from students whose companies³ indicated they would pay tuition. University of Washington Tacoma's MSCSS program has

¹ Conceptually, Computing and Software Systems represents a cross between computer science and software engineering.

² The MSCSS program would also enable workers in fields, such as aerospace, architecture, and management consulting, to apply computing and software skills to advance their careers.

³ Including Microsoft, Boeing, Amazon.com, and Siemens Medical Solutions.

experienced high enrollments, and it is expected this level of demand also will be present for an MSCSS program offered in Bothell, a high-technology corridor. Furthermore, enrollment in computer science and computer engineering is experiencing a national surge. A March 2009 Computing Research Association survey found that for 2007-2008, total enrollment for computer science and computer engineering departments had increased 6.2 percent over the previous year, and total enrollment (considering only majors) had increased 8.2 percent. This was the first increase in total enrollment in six years, which may indicate a recovery from the dot-com collapse.

Data analyzed by the Association of Computing Machinery show more computer-related jobs being created now than before the dot-com collapse. In addition, the U.S. Department of Labor projects that computer related jobs will account for 5 of the 27 fastest-growing job categories in the nation (including two of the top four) during 2006-2016. The *2007 Washington State Labor Market and Economic Report* also projects annual growth in computer-related jobs of approximately 2.8 percent, much higher than the statewide average projected job growth. Finally, the March 2009 joint report *A Skilled and Educated Workforce*, indicates an average annual gap between supply and demand for computer science degrees of 921 degrees.

Program Description

The program's target audience, objectives, and curriculum⁴ remain the same as they were in the original proposal. The program would serve a variety of students, ranging from computing professionals who hold BSCSS degrees to students seeking career transitions who hold bachelor's degrees unrelated to computing. The program would offer evening classes to accommodate working people, who could enroll part-time.

The program would prepare students to:

- Be proficient in identifying appropriate technological solutions to computing and software problems from their chosen application domain;⁵
- Apply critical thinking skills and cross-disciplinary knowledge to problems whose solutions require computing/software and application domain synthesis; and
- Develop effective oral and written communication skills and team membership skills.

The MSCSS program would consist of 45 credits. The curriculum would include 3-5 required core courses (15-25 credits), 2-4 specialized electives (10-20 credits), and a 10-credit thesis or capstone project. The core courses would be chosen from among four groups:

- Programming (5 credits)
- Design (5 credits)

⁴ However, individual classes would be updated as necessary.

⁵ A field, such as aerospace, would be an example of an application domain.

- Foundations (5 credits)
- Systems (0-10 credits, depending on student's background—more advanced students would substitute specialized electives instead)

Program Costs

The MSCSS program would enroll 16 FTE students in the first year, growing to full enrollment of 45 FTE students by the third year. The program would be self-supporting rather than state-funded. The revised budget projects a deficit of \$61,484 prior to the program's first year, followed by a deficit of \$67,821 during the first year of enrollment. After the first year, the program would become profitable, with a projected surplus of \$60,250 in the second and \$381,742 by the third year. The degree would cost students \$29,250.

External Review

Two reviewers assessed the proposal: Dr. el-Hadi Aggoune, Roy C. Anderson Chair Professor and Director of Engineering Programs, Henry Cogswell Polytechnical University; and Dr. Peter Shirley,⁶ Senior Research Scientist, NVIDIA Corporation and Adjunct Full Professor of Computer Science, University of Utah. Both reviewers were asked to comment on the appropriateness of the curriculum in the original proposal, given the time that has passed since the program was approved. Both reviewers had only positive comments about the MSCSS program.

Dr. Aggoune noted the program has several unique features; and the goals, objectives, and learning outcomes are clearly articulated and measurable. He also suggested it is reasonable to conclude that the MSCSS will reach or exceed the budgeted enrollment figures. He stated that the “. . . program as presented is still appropriate despite the time elapsed since 2003 . . .” and furthermore, UWB's updated documentation convincingly demonstrates that the program would have the resources necessary for successful operation.

Dr. Shirley noted that the program's short-term and long-term prospects are good. He said, “I want to emphasize that I believe the program is still appropriate despite the time elapsed since 2003. In fact, I think if anything, it is more appropriate as the basic economic issues in favor of the opportunity for entering this program have increased, while the educational issues of how to deliver this program have changed little.”

⁶ Prior to his appointment as Senior Research Scientist at NVIDIA, Dr. Shirley was a tenured full professor at the University of Utah. He was one of the reviewers who reviewed the original proposal back in 2003, but Dr. Aggoune was not.

Public Comment

Dr. Dennis Murphy, Provost and Vice President of Academic Affairs at Western Washington University (WWU), submitted a letter containing comments from WWU's Computer Science Department regarding the MSCSS program. The letter noted some positive features, but it also raised concerns regarding whether the program content was undergraduate or graduate level.

Program planners responded that courses would not be composed of undergraduate material; rather, they would build on either undergraduate preparation or prerequisite courses taken by career transition students. "Moreover, as in all of our graduate courses, master's students will be required to perform at a higher level of maturity and independence than undergraduates, and course deliverables will typically include projects and papers that analyze and implement advanced algorithms and techniques that they have learned. Students will also be required to read and understand current technical literature and present their findings during class and at program research seminars."

Staff Analysis

The program was approved by the HECB in 2003 but was not implemented due to lack of funding. UWB has provided sufficient evidence of student and employer need for the program, and responsiveness to need was confirmed by reviewer comments that the program is still appropriate, despite the time elapsed since 2003. Given the level of detail in the original proposal, the concerns raised by WWU about the curriculum were reasonable, but UWB responded sufficiently to those concerns. The budget appears adequate to support the program, which after some initial losses, would more than pay for itself.

Staff Recommendation

After careful review of the proposal and supporting materials, staff recommends approval of the Master of Science in Computing and Software Systems at the University of Washington Bothell. The HECB's Education Committee discussed the proposal during its July 9, 2009 meeting and recommended approval by the full Board.

RESOLUTION 09-11

WHEREAS, The University of Washington Bothell proposes to offer a Master of Science in Computing and Software Systems; and

WHEREAS, The program was previously approved by HECB Resolution 03-07 on April 23, 2003; and

WHEREAS, The program was never implemented due to lack of state funding; and

WHEREAS, The University of Washington Bothell has submitted sufficient evidence to indicate that the program's self-support budget would provide adequate funding; and

WHEREAS, The University of Washington Bothell has submitted sufficient evidence to indicate continuing need for the program; and

WHEREAS, The University of Washington Bothell has submitted sufficient evidence to indicate that the program is still appropriate, despite the time elapsed since it was originally approved; and

WHEREAS, The program has support from external reviewers;

THEREFORE, BE IT RESOLVED, That the Higher Education Coordinating Board approves the Master of Science in Computing and Software Systems at the University of Washington Bothell effective July 28, 2009.

Adopted:

July 28, 2009

Attest:

Jesus Hernandez, Chair

Roberta Greene, Secretary