WASHINGTON HIGHER EDUCATION COORDINATING BOARD

March 2010

Master of Geographic Information Systems
University of Washington

Introduction

The University of Washington (UW) seeks approval to establish a Master of Geographic Information Systems degree program beginning summer 2010. Housed within the Geography Department of the College of Arts and Sciences, this professional graduate degree would be offered in partnership with University of Washington Educational Outreach (UWEO). It would be offered part- or full-time via hybrid delivery, mainly online but with intensive one-week, face-to-face summer sessions at the beginning, middle, and end of the program for most students.[1]

This self-sustaining program would provide a graduate-level opportunity for early- and mid-career professionals to learn Geographic Information Systems (GIS) technologies and apply them to the field of sustainability.[2] It would prepare them for work in occupations such as geospatial analyst, geospatial data administrator, or geospatial systems manager. It would enroll 17 FTE students in its first year and achieve full enrollment of 36 FTE by its fourth year. At full enrollment, it would graduate 22 students per year.

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

The primary mission of the University of Washington is the preservation, advancement, and dissemination of knowledge. For over 25 years, the Geography Department has provided GIS training as part of its graduate program, which offers an M.A. and Ph.D. in Geography.

---

[1] The program is designed to be taken part-time over nine quarters, including three summer quarters. If space permits, exceptionally capable students may complete the program full-time in five quarters, including two summer quarters.

[2] GIS is a combination of hardware, software, data, people, procedures, and institutional arrangements for collecting, storing, manipulating, analyzing, and displaying information about spatially and temporally distributed phenomena for the purpose of inventory, decision making and/or problem solving within operations, tactical, strategic, scientific, and management contexts. Initially, the program would offer a single concentration in sustainability, a field with complex problems for which GIS methods are useful. As the proposed program evolves, the department would consider adding other concentrations, such as health or green economy.

However, the M.A. is an academic degree awarded along the way to a Ph.D. and does not serve working professionals. Thus the proposed program would support UW's dissemination mission by broadening UW's graduate-level GIS education audience to include working professionals and teaching them to use GIS technology to address complex problems involving tradeoffs among economic, social, and environmental issues.

The proposed program would support the *2008 Strategic Master Plan for Higher Education* by responding to implementation priorities identified in *Opportunities for Change: Implementing the 2008 Strategic Master Plan for Higher Education*. In particular, it would build a larger pipeline by serving more working adults. Additionally, it would support efforts to "expand on demand" by focusing on geospatial technologies among new employment sectors such as sustainability.

Diversity

To ensure diversity, the department would:

- Work cooperatively with UW Professional and Continuing Education and the Graduate Opportunities and Minority Achievement Program (GO-MAP) to ensure that marketing materials will attract qualified underrepresented candidates;
- Directly contact underrepresented candidates identified by GO-MAP;
- Involve faculty and graduate students in diversity liaison activities;
- Exploit the program director's contacts with Native American Tribes and expertise in locating specialized list-serves and internet sites gained from his research;
- Appoint at least two participants from underrepresented populations to the program's advisory board;
- Endeavor to submit at least one grant proposal per year that focuses on educational improvement for under-served populations;
- Endeavor to recruit diverse applicants for faculty positions.

Program Need

Although the joint report, *A Skilled and Educated Workforce* (March 2009),[3] does not identify a specific employer need for people with geospatial training, it does identify a mismatch between supply and demand for computer-related occupations. As additional evidence for employer

[3] A joint needs assessment report by the Higher Education Coordinating Board, the State Board for Technical and Community Colleges, and the Workforce Training and Education Coordinating Board. The joint report specifically identified supply-demand gaps for computer science and engineering (including software engineering).

need, program planners note the expansion of GIS technologies in government and industry. For example, a High-Growth Industry Profile on the U.S. Department of Labor's website reports that the geospatial technology sector is "growing at an annual rate of almost 35 percent, with the commercial subsection of the market expanding at the rate of 100 percent each year."[4]

Consistent with this profile, the Department of Labor's Bureau of Labor Statistics projects faster than average growth in employment for cartographers and computer and information systems managers. The Employment Security Department's long-term occupational projections are consistent with the federal projections.[5] Both state and national projections are corroborated by inquiries to the Geography Department from local employers such as the City of Bellevue, Weston Engineering, and Genwest Systems seeking graduate-level GIS graduates.

Students appear to be aware of the job opportunities GIS knowledge and skills open up for them. Over the past five years, the Geography Department was unable to serve about 100 mostly well-qualified graduate program applicants who sought a GIS emphasis. In addition to the graduate program, the university offers an extension GIS certificate program, which routinely fills to capacity. During the past year, 64 qualified applicants applied for 32 slots. In November 2009, UWEO surveyed undergraduate alumni (1999-2009) associated with 14 UW programs, graduates (2004-2009) of the GIS certificate program coordinated by UWEO, current members of the Urban and Regional Information Systems Association (URISA), and current members of the Northwest GIS users group, finding that 356 (57.6 percent) of 619 respondents said that they were very or somewhat interested in the proposed program.

The proposed program would meet community needs by combining GIS with sustainability content in a way that equips graduates with knowledge important in solving local, regional, and global sustainability problems. The local community would benefit because the proposed program includes a capstone GIS Workshop course that would tie GIS project coursework to community service. The Geography Department has a lot of experience providing service learning opportunities. For example, in 2008, students and faculty collaborated with the Department of Ecology and Herrera Environmental Consulting to examine storm water-induced contaminant flow from roadways of a King County watershed into Puget Sound.

Although UW and Western Washington University (WWU) both offer master's programs in geography, no public or private university or college in Washington currently offers a degree that is comparable in content or mode of delivery. Thus, the proposed program would not duplicate other programs in the state.

[4] http://www.doleta.gov/BRG/Indprof/geospatial_profile.cfm. The website indicates that the source of the statistics is the Geospatial Information and Technology Association.

[5] According to Employment Security Department projections, computer specialists; architects, surveyors, and cartographers; and social scientists and related workers all have greater-than-average statewide projected growth rates for 2012-2017.

Program Description

The proposed program would prepare graduates to understand and apply GIS technology to complex problems involving economic, social, and environmental tradeoffs. Primarily, it would serve working professionals who have had exposure to GIS and seek further expertise or a career change. It would be offered part- and full-time via hybrid on-site and online delivery.[6]

To be admitted, students would need to have a B.A. or B.S. degree, competitive GRE scores, a minimum TOEFL score determined by the graduate school, and at least a year of work experience. They also would need to submit a statement of educational objectives. Students would be admitted annually in a cohort, and most would attend part-time, completing their study in nine quarters.

Once admitted, students would take nine 5-credit courses, for a total of 45 credits. The program would consist of a 25-credit GIS core and a 20-credit concentration in a specific subject area. Initially, the concentration would focus on sustainability, but other concentrations might be offered as the program matures. Courses would address the relationships among social/cultural, environmental, and economic issues, fostering insights about the balance and tradeoffs among processes and outcomes at local, regional, national, and global scales. Although students would not write a thesis, they would take a final capstone course that would immerse teams in the full range of tasks associated with a GIS project, culminating in the presentation of a final report.

Five courses already exist, and four would be new. The existing courses would all need to be modified for on-line delivery, and the faculty has not previously taught on-line college courses. Teaching effort would be shared between tenured/tenure-track faculty and affiliate faculty/lecturers. [7]

Students would normally complete the proposed program in two years and one summer (part-time) and be prepared to:

- Ask and follow through on appropriately scaled and applied research questions;
- Find, code, and manage data of multiple kinds;
- Tackle complex sustainability decision problems by managing, analyzing, and displaying geospatial data;

[6] Six out of nine required courses would be offered entirely online, and three summer courses would include online elements, plus a week-long face-to-face session. Online delivery would be asynchronous most of the time, but synchronous chat sessions would be set up for student groups wanting to share insights. Chat sessions would be moderated by faculty or teaching assistants, and students would be encouraged to build upon the contributions of each other through discussion and problem solving.

[7] Except for the second year of the program, the majority of instructional FTE would be provided by tenured/tenure-track faculty. Program planners estimate that at full enrollment, instruction exclusive of summer courses would require 1.75 FTE tenured/tenure-track faculty (including 1.0 FTE to be hired) and 0.5 FTE affiliate faculty/lecturers (all to be hired). Program planners estimate that about 80 percent of affiliate faculty/lecturers would hold doctoral degrees.

- Negotiate and participate in group deliberations around mapping and analysis;
- Produce original and creative work related to sustainability problems around the world;
- Gain appreciation for cultural, institutional, and organizational contexts of sustainability decision problems around the world by exploring case studies that make use of decision situation assessment.

These student learning objectives would be measured through quizzes, lab assignments, and short-answer essay questions tied to the objectives and topics of each course and to overall program outcomes. Student progress would be monitored through online meetings with academic advisors. The capstone course would offer students a culminating opportunity to demonstrate their skills and knowledge in a group project. Capstone work products would be evaluated by community partners. Peer assessments would also occur as students comment on each others' group work.

Program assessment approaches would involve a mixture of external professional guidance and internal assessment strategies and tools to ensure that the program's goals, objectives, and outcomes would align with current employer needs and meet the academic rigor of a graduate-level program. Program assessment approaches would include:

- Entry surveys to assess student expectations and goals;
- Peer review of teaching materials by faculty to ensure high quality courses;
- Advisory board[8] evaluation of course materials, with each member evaluating a course he or she is interested in;
- Regular surveys of current students to assess and update the program, including standard university course evaluations plus targeted detailed course evaluations;
- Assessment of enrollment and attrition rates, including follow-up with students who withdraw to determine reasons for dropping out and identify plans for returning for further study;
- Exit interviews of all graduating students with a follow-up evaluation one year after program completion;
- Regular alumni surveys, including annual surveys of graduates at one and five years from graduation to determine whether skills and knowledge acquired in the program led to increased advancement and opportunity in the workplace, enhanced their professional development, or led to innovative new work practices, products, or projects;
- Annual benchmarking study of peer programs to identify current best practices and areas for program growth and refinement.

[8] The program would maintain an ongoing advisory board consisting of faculty and GIS-savvy professionals from public and private organizations such as the City of Seattle, Department of Ecology, and various businesses.

Data from all of the above approaches would be used to assess and improve the content and curriculum of the program.

Program Costs

The proposed program would enroll 17 FTE students in the first year, growing to full enrollment of 36 FTE students by the fourth year. For instruction at full enrollment, program planners have budgeted 1.75 FTE for full-time tenured/tenure-track faculty and 0.5 FTE for affiliate faculty/lecturers. For administration at full enrollment, program planners have budgeted 0.15 FTE for a program director (Department of Geography), 0.10 FTE for an assistant director (beginning in Year 2 and continuing through full enrollment), 0.5 FTE for a laboratory technician, and 0.5 FTE for an administrative specialist. Many of the details of program management would be taken care of by UWEO.[9]

Funded entirely by course fees, the program would be self-supporting. Program planners estimate it would cost a student entering in summer 2010 $25,930 to complete the degree. According to program planners, this "occupies the middle of the range" compared to the cost of 17 similar graduate programs. At full enrollment of 36 FTE students in Year 4, the direct cost of instruction would be $538,593, or $14,961 per FTE student. In comparison, according to the HECB's *2005-06 Education Cost Study (July 2007)*, the direct cost of instruction per average annual FTE graduate student at UW Seattle is $14,004 for social sciences students and $14,623 for computer science students.

External Review

Two reviewers evaluated the proposal: Dr. Ronald Briggs, Professor Emeritus and Former Director, Programs in Geography and Geospatial Information Sciences, University of Texas at Dallas; and Dr. Zhong-Ren Peng, Professor and Chair, Department of Urban and Regional Planning, University of Florida.

Both reviewers recommended approval of the program, noting the high quality of Geography Department faculty. Both approved of the curriculum, although Dr. Briggs felt that the sustainability component could be strengthened, and Dr. Peng recommended adding other application domains besides sustainability. Both recommended giving significant attention to web-based GIS technologies. Both liked the delivery model, although Dr. Briggs felt that one week of face-to-face time in the summer might not give students enough time to "get the hang of it." Dr. Briggs also felt the course sequencing would make the program difficult to take full-time and suggested it may be better not to give students a full-time option. Finally, Dr. Briggs expressed concern about the sufficiency of faculty resources and the impact on existing programs.

[9] UWEO would provide program management services including public relations, market research, marketing and promotion, student recruitment, building and coordinating an advisory board, troubleshooting operational issues, budgeting and pricing, and facilitating classroom assignments. Program planners estimate a 0.5 FTE contribution from UWEO at full enrollment.

Program planners responded to curricular concerns by clarifying the courses in which the content in question would reside and stating the department's intent to add application domains (i.e., additional concentrations) if the program is successful. Program planners responded to Dr. Briggs' delivery model and course sequencing concerns by clarifying that the summer courses would include online components as well as the week of face-to-face instruction and that the small number of exceptional students who attempted to take the program full-time would be warned about the challenges of doing so. Program planners responded to the faculty resources and impact concerns by describing a staffing plan which included hiring qualified lecturers for GIS courses in the undergraduate program, including a Ph.D. candidate who has been a teaching assistant for one of the courses for two years.

Staff Analysis

The proposed program would support UW's mission and the *2008 Strategic Master Plan for Higher Education*. In addition, it would employ multiple strategies to enhance diversity.

Program planners provided sufficient evidence of student, employer, and community need. Applicant and survey statistics indicate the proposed program would serve a student audience that is currently underserved. Department of Labor and Employment Security Department projections are consistent with employer need, as are inquiries from local employers. Evidence from the media suggests communities at the local, regional, and global level need help solving sustainability problems. The proposed program would respond to these needs without duplicating existing programs.

The proposed program would complement existing certificate and academic graduate programs at the University of Washington by offering working professionals an opportunity to receive graduate-level training in GIS technologies and apply them to the field of sustainability and, as the program evolves, to other fields. Both reviewers noted the program's curriculum had sufficient depth, although one questioned the breadth of the sustainability component (to which program planners responded sufficiently).

The curriculum would be delivered via a hybrid delivery model, which should appeal to working professionals because of its significant online component. The face-to-face component, which would occur at the beginning, middle, and end of the program for most students, should help each class build a cohort identity. Both reviewers spoke favorably of the delivery model, although one questioned whether a single face-to-face week would be adequate (to which program planners responded sufficiently).

Students would be assessed using multiple measures, including a real-world capstone project. Program assessment would employ multiple measures as well.

The program is self-supporting and would cost the initial cohort of students $25,930 to complete, which program planners indicate is in the middle of the range of what peer programs charge. This suggests that the program would be offered at a reasonable cost.

Finally, both reviewers recommended approval of the program, and both noted the high quality of Department of Geography faculty. Although the current faculty excel in their field, HECB staff shared Dr. Briggs' concerns regarding the sufficiency of faculty resources and the impact on existing programs. Based on program planners' responses to follow-up questions, HECB staff believes that the staffing plan is sufficient.

Staff Recommendation

After careful review of the proposal and supporting materials, staff recommends approval of the Master of Geographic Information Systems at the University of Washington. The Higher Education Coordinating Board's Education Committee discussed the proposal during its February 16, 2010 meeting and recommended approval by the full Board.

RESOLUTION NO. 10-05

WHEREAS, The University of Washington proposes to offer a Master of Geographic Information Systems; and

WHEREAS, The program would support University of Washington's mission and the Strategic Master Plan for Higher Education; and

WHEREAS, The program would complement existing certificate and academic graduate programs at the University of Washington by offering working professionals an opportunity to receive graduate-level training in Geographic Information Systems technologies and apply it to the field of Sustainability, and as the program evolves, to other fields; and

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

WHEREAS, The program's student and program assessments feature multiple measures; and

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

WHEREAS, The program would be offered via hybrid delivery online and on-site at University of Washington Educational Outreach's Seattle and Bellevue facilities and the University of Washington's Seattle campus;

THEREFORE, BE IT RESOLVED, That the Higher Education Coordinating Board approves the Master of Geographic Information Systems at the University of Washington, effective March 10, 2010.

Adopted:

March 10, 2010

Attest:

_____
Jesús Hernandez, Chair

_____
Earl Hale, Vice Chair