

June 2008

Bachelor of Science in General Science Teaching Central Washington University

Introduction

Central Washington University (CWU), in cooperation with Edmonds Community College (EdCC), seeks approval to expand the degree options for secondary science teachers by establishing a Bachelor of Science in General Science Teaching. The new degree program would be offered on the EdCC campus where CWU's Lynnwood Center is co-located.

CWU considers itself the "predominant teacher training institution" in the state of Washington. Although the proposed degree program would further teacher education statewide, it has been developed with the clear intent to serve primarily the Snohomish, Island and Skagit counties region.

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

The proposed program supports the strategic goals of both CWU and EdCC. Part of CWU's mission is to work with community colleges to establish centers throughout the state and to use technology to extend the reach of its educational programs. An area of strategic focus for EdCC is to "create educational programs and services that are responsive and accessible to our community... and to become a hub of math, science and engineering education and math/science teacher preparation." The proposed program would result in increased collaboration, responsiveness, and accessibility as these institutions achieve their strategic goals.

In addition, the proposed general science teaching program supports the goal of promoting economic growth and innovation in the state's 10-year *Strategic Master Plan for Higher Education*. Policy objectives in the Master Plan include expanding bachelor's and advanced degree programs in key shortage areas including science, and improving student interest and participation in programs that are in high demand by employers.

Diversity

Both EdCC and CWU view diversity as a high priority. This proposed degree partnership and others between the institutions have been developed specifically as a strategy for addressing the needs of non-traditional students, including low-income, at-risk students, and students of color.

One of CWU's core values includes a commitment "to excellence achieved through a diversity of ideas and people." The goal of recruitment, support and retention of a diverse student population is aimed at maintaining and strengthening academic and student life at CWU campuses, and "creating an effective and efficient avenue for students to reach their goal of earning a baccalaureate degree in their own community."

Both institutions point to an array of services and strategies to enhance diversity at their institutions, including scheduling classes to accommodate and recruit non-traditional students, on-site access to financial aid, career counseling, computer labs, disability support services and writing and learning resource centers. Both CWU and EdCC point to partnerships with other higher education institutions, tribes, and ethnic and student organizations that are aimed at enhancing diversity.

CWU and EdCC faculty plan to increase their recruiting and retention efforts through a series of diversity-related activities, and they plan to keep records in the general science teaching program to demonstrate their success.

Program Need

The HECB's 2006 State and Regional Needs Assessment Report includes a recommendation for the state's higher education system to develop strategies to increase the number of qualified K-12 teachers in key shortage areas, including science. The shortage of qualified science teachers is highlighted in Governor Gregoire's November 2006 Washington Learns report, the 2006 Educator Supply and Demand Report by the Office of Superintendent of Public Instruction, and the state's Strategic Master Plan for Higher Education.

While this proposal points to studies that indicate student interest, the evidence cited was less than compelling. For example, in a 2004 survey (718 returned) of students in the surrounding communities indicating degree choice preferences, education was 10th on a list of top 10 choices, but science was not mentioned. The survey did indicate a strong preference by students for studying on a local campus.

A 2007 survey of students in chemistry, biology, and math classes, conducted at EdCC to ascertain student interest in a science teaching program, showed that 25 students were interested in chemistry or biology teaching degree programs. It is not known how many students were surveyed, or what the response rate was, so it is difficult to know if 25 interested students is a significant response.

A more compelling case pointing to student need or demand is the number of science associate degrees awarded to students who might look to CWU/EdCC for teacher preparation programs. In 2006-07, the State Board for Community and Technical Colleges reported that 350 science associate degrees were awarded by community colleges near the EdCC campus – Bellevue, Cascadia, Edmonds, Everett, North Seattle, and Shoreline.

Also, CWU cited significant projected demographic growth in the North Snohomish, Island, and Skagit (NSIS) region, which is the targeted service area. Current and projected population growth could be a strong indicator of future demand for more local baccalaureate degree programs. Population is projected to increase by 39 percent, 35 percent, and 46 percent by 2025, in North Snohomish, Island, and Skagit counties respectively.

This anticipated growth helped convince the state Legislature in 2006 to approve HB 3113, which provides for additional baccalaureate degree programs in the region. The bill stated that “low baccalaureate participation rates and low transfer rates are attributed to the lack of a baccalaureate institution in the region.”

CWU faculty has structured the program to attract non-traditional students and, therefore, does not consider the program to be duplicative of Western Washington University’s general science teaching degree program. The CWU program would be offered in the late afternoons and evenings and is geared to local-area students who are working or who anticipate changing careers.

Program Description

CWU’s general science teaching program is intended to prepare students to teach science in high school as well as middle or junior high schools.

A total of 87 credits are required in the general science teaching major spanning biology, chemistry, geology, and physics; 74 are common course credits, including laboratories; 13 credits are required in either a chemistry or biology endorsement area. In addition, students must earn 52 credits in the professional education program offered through the education department, including student teaching.

The proposed program is aligned with K-12 learning goals, and emphasizes assessment of student learning against standards. For example, in its planned methods courses offered through the education department, all lesson planning, unit planning and class activities require alignment with state-approved grade-level expectations.

EdCC’s associate degree articulates with CWU’s general science teaching degree, as illustrated through a transfer academic program plan. CWU expects to develop similar articulation plans with Everett Community College and with other local community colleges this summer and in the fall of 2008.

To earn the general science teaching degree, students would be required to complete an end-of-major portfolio that is aligned with the National Science Teachers Association Teacher Standards, the National Science Education Standards for Teachers, and CWU’s Center for Teaching and Learning Standards. Dimensions of the portfolio addressing content knowledge include inquiry and the nature of science, biology, chemistry, Earth and space science, physics, mathematics, and independent research and relevance.

The degree requirements would be structured to meet Washington's endorsement competencies, which measure basic skills and content skills in a specific endorsement area (chemistry or biology) enabling students to gain specialized expertise in their chosen area of study.

CWU faculty have designed the program so that students would be uniquely experienced in inquiry-based learning, and prepared to be reform agents in an age of continuing and evolving education reform.

Assessment

CWU's science education program is considered "a campus leader in program assessment." Program assessments are completed and reviewed at least annually, sometimes quarterly. Data is used from the assessments to improve programs offered in the science education program.

Data is obtained from multiple sources, including: student focus groups; course evaluations and end of course surveys; surveys of graduates to assess employment and career impact; standardized exit exams; and annual review and discussion of program elements by the Teachers of Teachers of Science, a statewide professional organization. Results of a five-year internal program review process and state and national accreditation reviews are also used for assessing program effectiveness.

A beginning-to-end assessment system is used to evaluate student proficiency, including entry and exit program surveys, course and program portfolios. Course portfolios are used to evaluate pedagogical knowledge and content knowledge in the sciences, including biology, chemistry, earth science, and physics teaching programs.

An extensive table was provided linking learning outcomes to program goals, methods of assessment and criteria for assessing achievement of state and national standards.

Program Costs

The proposed general science teaching degree program anticipates enrolling 15 FTE students in the first year, growing to 25 FTE students by the second year. Staffing for the program includes .5 FTE for clerical and support staff for years one and two, and .6 FTE faculty and .82 FTE faculty in years one and two respectively.

Core courses in the science major would be taught by a combination of tenured or tenure-track faculty, and adjunct faculty from EdCC or CWU. Two part-time adjunct faculty members, yet to be hired, will fill .24 of the FTE teaching load in both years. All faculty would have at least a master's degree and all would be expected to be qualified to teach in the field they are assigned to teach.

With an entering class of 15 FTE, the total cost for the first year of the program would be \$92,068, or \$6,138 per FTE. At enrollment of 25 FTE in the second year, the total budget would be \$121,499, or \$4,860 per FTE. This compares favorably with the average annual cost per FTE for upper division students majoring in education at comprehensive institutions. According to

the HECB's 2005-06 Education Cost Study (July 2007), the direct cost per average annual upper division undergraduate education student FTE ranged from \$4,496 at Eastern Washington University to \$6,567 at Western Washington University, and was \$4,838 at CWU.

External Review

The program was reviewed by three external experts: Dr. Louise Baxter, Bainbridge High School; Dr. Murray Jensen, H.T. Morse-Alumni Distinguished Teaching Professor of Biological Science, University of Minnesota; and Dr. Mark Windschitl, Chair of Curriculum and Instruction, Associate Professor in Curriculum and Instruction, Department of Curriculum and Instruction, University of Washington.

Initially, there seemed to be significant disagreement among the first two reviewers regarding sufficiency or adequacy of content. One reviewer, Dr. Baxter, recommended that more emphasis should be placed on chemistry, i.e., include a chemistry sequence as a requisite for those who choose a biology endorsement. A second reviewer, Dr. Jensen, was more comfortable with the science content as proposed. CWU responded that it just recently revised its first-year biology sequence to better address state teaching competencies, including more cellular and molecular biology. Students seeking an endorsement in biology would be required to take a year of chemistry, in effect, as a pre- or co-requisite of the biology sequence.

It is anticipated that students graduating from the proposed program would be prepared to meet the state competencies in their area of emphasis; be more than adequately trained in general science content; and be very well trained in general methods, science teaching methods, pedagogical content knowledge, relationship between the sciences, and dispositions.

A third external reviewer, Dr. Windschitl, agreed with CWU on sufficiency or adequacy of content. He stated that "the program does seem coherent in its sequence of courses, curriculum, assessment of outcomes, etc.," and "because it is a general science degree, the coursework in science content must necessarily be distributed across multiple disciplinary domains."

He also said that there is enough chemistry to complement biology and earth science, and believes that the preparation and distribution of science and education courses required in the proposed program is comparable to that found at other institutions offering a traditional four-year general science teaching degree.

Staff Analysis

The 10-year Strategic Master Plan for Higher Education includes a policy goal for investing in teacher preparation to raise student proficiency in math and science. Additionally, there is substantial support for improved science education among state elected officials, including Governor Christine Gregoire, the Legislature, and the Superintendent of Public Instruction. Regularly, the need for initiatives to improve and expand science education continues to be highlighted in state and national reports and in legislation.

The collaboration between Central Washington University and Edmonds Community College addresses an important need – the creation of a teacher preparation program that caters to local-area students, including non-traditional students who may be seeking to change careers. The collaborative effort also is consistent with EdCC's vision to create a science/math/engineering hub in Snohomish County, where projected growth there and in the surrounding area, is significant. In addition, as mentioned previously, the Legislature approved HB 3113 in 2006, calling for additional baccalaureate degree programs in the NSIS region.

There were concerns voiced by faculty about the sufficiency of course content. These types of concerns are not uncommon among faculty who head existing general science teaching programs: Is the program rigorous enough? Is faculty qualified? Are facilities adequate? Is there a sufficient student assessment plan in place, for example, beyond the level of the WEST-E, which measures the content knowledge required for endorsement for Washington teaching certificates?

CWU's proposed general science teaching program addresses these general concerns to a reasonable extent by clearly outlining its plans to establish sufficient rigor in general sciences and in specialty areas, to align learning goals to appropriate standards, and to measure both student learning outcomes and program effectiveness.

Also, CWU faculty state there is sufficient laboratory capacity at EdCC to accommodate the program. The staffing plan outlined in the proposal indicates that adequate steps are being taken to ensure that existing faculty and yet-to-be hired faculty will be competent and qualified to teach the courses assigned.

Recommendation

Based on a thorough review of Central Washington University's proposal to establish a Bachelor of Science General Science Teaching degree at Lynnwood in partnership with Edmonds Community College, HECB staff recommends approval by the Higher Education Coordinating Board. The HECB Education Committee discussed the proposal during its June 23, 2008, meeting and also recommend approval by the full Board.

RESOLUTION NO. 08-21

WHEREAS, Central Washington University proposes to offer a Bachelor of Science General Science Teaching degree; and

WHEREAS, The program would support the *Strategic Master Plan for Higher Education's* policy objective of investing in teacher preparation to raise student proficiency in math and science; and

WHEREAS, There is substantial support for improved science education among state elected officials; and

WHEREAS, The need for initiatives to improve and expand science education continues to be highlighted in state and national reports and in legislation; and

WHEREAS, The collaboration between Central Washington University and Edmonds Community College addresses the needs of local-area students, including non-traditional students who may be seeking to change careers; and

WHEREAS, The program would respond to projected growth in the Snohomish, Island, and Skagit counties region; and

WHEREAS, The program would be authorized at Central Washington University's Ellensburg and Lynnwood campuses;

THEREFORE, BE IT RESOLVED, That the Higher Education Coordinating Board approves the Bachelor of Science General Science Teaching degree at Central Washington University's Ellensburg and Lynnwood campuses, effective July 21, 2008.

Adopted:

July 21, 2008

Attest:

Bill Grinstein, Chair

Roberta Greene, Secretary