Proposal for Collaborative OCEPT Fellowship 2000-2001
Division of Natural Sciences and Mathematics
Western Oregon University

Prepared By

Bryan Dutton, Ph.D., Biology Department
Jeff Myers, Ph.D., Earth and Physical Science Department
Pete Poston, Ph.D., Earth and Physical Science Department
Steve Taylor, Ph.D., Earth and Physical Science Department

INTRODUCTION

The Division of Natural Sciences and Mathematics at Western Oregon University proposes to develop a conceptual model for a Summer Institute focusing on integrated field studies in the Willamette Valley. The Summer Institute will be directed towards training undergraduate education majors and continuing M.Ed. students in the Natural Sciences via collaborative, integrated field modules covering aspects of geology (geomorphology, earth history), environmental chemistry, and biology (botany / field ecology).

PROJECT OVERVIEW

Western Oregon University (WOU) is located in the mid-Willamette Valley, and offers both comprehensive Liberal Arts degrees as well as nationally-recognized teacher education programs. Western Oregon University has experienced an increase in enrollment of more than 70 percent since the early 1980s, compared to an increase of about 5 percent for the entire university system. The population that Western serves originates principally from the Willamette valley, and more than 90% of the students are Oregonians and come from every county in the state.

The teacher education program at Western Oregon University was recently selected in a national study as one of five exemplary programs in the nation in using teaching and learning strategies effectively to enhance student success. WOU is also recognized for its outstanding opportunities for minority students, primarily Hispanic students, by "Hispanic Outlook in Higher Education", a national publication. For the past two years, students of color have represented between 9 and 10% of the enrollment at WOU. Preliminary data indicate similar numbers this year. The goal is to reach 11% by 2000 and 13% by 2005.

With such a strong teacher education program and the potential to include more diversity in it’s programs, there exists a unique and timely opportunity to design a Summer Institute at WOU. The philosophy of this Institute is to bring together undergraduate majors in education with returning teachers. The curriculum will be designed to have them interact together in new courses that will stimulate the undergraduates as well as help returning teachers with Master's Level coursework that can be applied to their continued licensure.
Members of the Biology, Geology, and Chemistry departments will collaborate together to design this new curriculum. The first course to be designed will be 4 weeks long and consist of approximately equal parts of Biology, Geology, and Chemistry. The course will be team-taught, with each professor contributing in their area of expertise. The course will consist of a total of 12 credit hours at the 400/500 level. Furthermore, the content of this course will chosen such that the benchmarks required by the Teacher’s Standards and Practices Commission.

PROPOSED SCIENCE MODULES

Environmental Chemistry Module - Pete Poston

The Environmental Chemistry module will emphasize the importance of water pollution in the watersheds of Western Oregon. In particular, since the Environmental Protection Agency (EPA) has just recently designated the lower Willamette River as a Superfund site, the chemistry behind this pollution should be examined. In addition, the Willamette Valley is home to three National Wildlife Refuges: Baskett Slough, Ankeny, and Finley Wildlife Refuges. These refuges are located in the middle of agricultural areas that produce large amounts of herbicides. The effect of these non-point sources of pollution on the water quality will be addressed. And finally, since the Willamette River is a source of drinking water for the town of Corvallis, and is located approximately 10 miles downstream from a major paper mill (Pope and Talbot), the chemistry of dioxins can be investigated and explained. There are many other examples that can be taken from the EPA’s website of pollution sites in Oregon (e.g. http://map2.epa.gov/enviromapper/).

Geomorphology Module - Steve Taylor

The Geomorphology module will focus on analysis of surficial processes operating at the watershed scale. The Willamette Valley of west-central Oregon represents one of the most dynamic and spectacular geologic environments in the United States. Tectonic plate convergence, intense rainfall patterns, steep mountain slopes, and expansive intermontane valleys provide for an active geomorphic setting associated with seasonal flooding, seismicity, and slope failure. Geomorphic processes operating at the watershed scale have a profound influence on both the local biota and aqueous chemistry of surface waters. Surficial processes are in turn controlled by the bedrock environment and geologic history of a given area. Thus the proposed integrated science modules are well-suited to the interdisciplinary, collaborative goals embodied by the OCEPT science education initiative. To this end, the Geomorphology module will include the following components: (1) overview of geomorphic principles, (2) morphometric analysis of basic watershed parameters (e.g. drainage area, stream density, stream gradients, hillslope gradients), (3) geomorphic mapping of fluvial and hillslope landforms (e.g. floodplain, channel, landslide deposits), (4) basic watershed hydrology (stream discharge, stage, precipitation levels), and (5) data synthesis using Geographic Information Systems.

Earth History Module - Jeff Myers

The Earth History module will examine the sedimentary and fossil record of the mid-Willamette Valley. The Willamette Valley and Western Cascades host an outstanding fossil plant
record of climate change. At least 50 fossil plant localities are readily accessible from major
roads, and are easily collected by amateurs. Of particular interest are the Goshen and Willamette
paleofloras immediately south of Eugene, which are interpreted to record leaf morphological
evidence of catastrophic climatic cooling. The module will include the following components:
(1) observation and sampling of the Goshen-Willamette floras in the field, from existing collections,
and from literature and internet sources; (2) the use of simple and easily observable leaf margin
characteristics to estimate climate variables from modern and ancient vegetation; (3) the
scaling of field and laboratory experiments to develop practical exercises suitable for the classroom.

The module will meet the needs of an inquiry-based science curriculum by incorporating the
generation of hypotheses based on the direct observation and analysis of modern vegetation, the
careful collection and description of fossil data, and the testing of hypotheses about ancient climate
conditions by comparison with trends observed in analogous modern vegetation.

**Botany / Field Ecology Module - Bryan Dutton**

The Botany / Field Ecology module will examine the relationship between riparian habitats of
the Willamette Valley, especially the Willamette River, and the floras supported by them. Western
Oregon provides exceptional opportunities for detailed field-based studies of diverse riparian
habitats. These areas are easily accessible especially along the Willamette River and are in close
proximity to the Western Oregon University campus. The module will include an historical and
current characterization of several Willamette River riparian habitats along with concomitant floristic
changes of these areas. This will be an especially viable vehicle for assessing the introduction and
impact of invasive plant species along a major “corridor” within the Willamette Valley. This module
will include the following components: (1) introduction to basic ecological and botanical survey
principles and techniques; (2) examination and sampling of Willamette riverine floras using existing
and new plant specimen collections, literature, and internet sources; (3) mapping of both habitats
along with species encountered in these areas; and (4) data synthesis and analysis using Geographic
Information Systems (GIS). This module, when combined with the following modules, will meet
several of OCEPT’s objectives primarily through the integration of basic concepts from each of these
disciplines along with the employment of “tools” that are increasingly being “shared” by these
different disciplines (e.g., GIS).