

November 1, 2007 Update of Departmental Activities

LIFE SCIENCES (DEPTS. OF ZOOLOGY, BOTANY, AND MICROBIOLOGY & IMMUNOLOGY)

Two LS-CWSEI Science Teaching and Learning Fellows (STLF) are now on board: Tamara Kelly and Harald Yurk; Skylight Research Associate Gülnur Birol is also playing a significant role.

The departments have begun a project to collate and examine the learning outcomes in upper level courses to help the redesign of lower level courses so they are appropriate prerequisites. This analysis will also inform the examination of overall program outcomes for graduates.

STLFs are working with Instructors of BIOL 112: Cell Biology to define learning outcomes, key concepts, and important misconceptions of students. This analysis will help devise activities for a newly established student help centre.

Faculty are redesigning the first biology course for non-majors and analyzing different modes of instruction in second year Biology (BIOL 200: Cell Biology I: Structural Basis)

A survey is being designed to gain a better understanding of first-year students' attitudes towards learning Biology. It is a tool to investigate how instruction in Biology fosters "expert thinking" in students.

A survey of employers in BC is being planned to collect information about their expectations for graduates with a B.Sc. in Life Science from UBC. This information will fit into the examination of the program outcomes for the streams in Biology.

PHYSICS & ASTRONOMY

Three key activities have been underway:

Teaching Assistant training program: Graduate student Mya Warren spearheaded this effort and assembled a strong team to develop and run a two-day workshop. The workshop, run at the beginning of this term, was required for incoming graduate students. A system of mentor TAs was initiated to provide a structure in which senior graduate students can oversee other graduate students in our first year undergraduate courses and help to develop their teaching skills. Adjustments to the TA training program are underway and will be enhanced by a new graduate course in pedagogy in Physics & Astronomy.

Computer-based teaching material archive: IT staff Gerry Grieve has created a pilot teaching material archive in consultation with Prof. Chris Waltham, director of Science One. Waltham and Prof. Jaymie Matthews, who teaches ASTR 101: Introduction to the Solar System and ASTR 310: Exploring the Universe I: The Solar System, are currently testing the archival tools.

Learning goals development and course improvement: The largest project on a particular course thus far involves introductory course PHYS 100: Introductory Physics. The course is introducing physics concepts within themes relevant to contemporary life and real world problems such as energy usage and global warming. The lectures are using a Personal Response System, or clickers, and the labs and tutorials have been streamlined together and emphasize context-rich problems. The team working on PHYS 100 consists of Fran Bates, Andrejz Kotlicki, Fei Zhou, and Georg Rieger. They are also employing our first use of "mentor TAs" and have the further assistance of Sandy Martinuk, the department's first graduate student to tackle a research project in physics pedagogy. With Sandy's

involvement, the course has already been through a first round of pre- and post-testing, plus interviews with individual students.

CHEMISTRY

CHEM 233: Organic Chemistry for Life Sciences has used the University of Colorado's Learning Attitudes about Chemistry survey to measure 1,500 students' beliefs about learning chemistry. The goal is to ensure education improvements are both helping students learn and developing their ability to think like experts about chemistry.

Spearheaded by Chemistry Skylight Research Associate Jackie Stewart, CHEM 233 has undergone an iterative redesign process over the last two years to increase student learning. Elements of the redesign consist of active learning in the classroom, online support development, and learning goal alignment. This work has been supported by Skylight and complements the CWSEI effort.

A substantial effort to carry out the assessment of student learning in the first year lab course and add and assess a variety of improvements is getting underway.

STATISTICS

Efforts in the Dept. of Statistics CWSEI project involve a transformation of STAT 200: Elementary Statistics for Applications, the department's largest introductory course in terms of enrolment. Faculty members Bruce Dunham, Nancy Heckman, and Eugenia Yu have created detailed learning outcomes, devised a questionnaire to discover student attitudes towards the discipline both before and after the course, and run workshops where students can discuss problems in groups.

Personal Response Systems, or clickers, with concept-based questions probing understanding have been incorporated into the course lectures for the first time. The PRS has had an immediate impact, particularly in terms of student attendance and engagement. The instructors see the students learning more in lectures due to the benefit of being able to provide instant feedback addressing any confusion that is evident. Instructors are learning how to focus teaching and assessment on the key ideas, and discovering the many ways in which students can misunderstand the concepts in the course. The instructors are very pleased with the changes they have made so far, and think the students are greatly benefiting.

COMPUTER SCIENCE

An STLF, Beth Simon, who has considerable experience in computer science teaching and education research, has begun work.

20 faculty have been involved in discussions around articulating learning goals.

Faculty members Steve Wolfman, Anne Condon, and Holger Hoos have developed course- and lecture-level learning goals for CPSC 101/WMST 201: Connecting with Computer Science. Regular PRS and written exercises have also been introduced to engage students in material and frequently assess their progress, and they have begun a new "split session" where the class self-selects into two separate lecture/lab groups, with one group looking at applications of algorithms to biology (including DNA sequencing) and another at applications to visual art.

Attitudinal surveys involving 250 students in CPSC 111: Introduction to Computation and CPSC 121: Models of Computation are underway. Students are asked about their beliefs about computer science and perspectives on learning.

Cross-disciplinary observations are being planned among science departments to share teaching techniques.

Teaching assistants have expanded their normal annual six-hour training session to include an optional mid-term session, in which they bring summaries of informal student evaluation results and discuss ideas and techniques for improving their teaching and their students' learning.

EARTH & OCEAN SCIENCES

In addition to the work on the Natural Disasters course discussed in the UBC Reports article *Winds of Classroom Change* (<http://www.publicaffairs.ubc.ca/ubcreports/2007/07nov01/winds.html>), there have been a number of other activities. These include:

The assessment and improvement of the introductory laboratory, EOSC 111: Laboratory Exploration of Planet Earth. Faculty and STLFs are working together to design brief assessments linked to lab-specific learning goals and are administering these assessments in a pre- and post-lab paired structure, to gain information about how the lab activities change (or don't change) student thinking about lab concepts. We have also instituted a process for midterm feedback for teaching assistants in this course.

Creation of a new Teaching Assistants training program. A pilot program is underway this term, and the department plans to offer another round of the TA training program during Winter term 2, using experience gained from the pilot.

Development of an attitudinal survey that probes students' beliefs about earth sciences and how that science is learned and used. The department has used this survey in multiple courses. At the end of this term, the department will have data to assess how the courses affected students' attitudes.

Work on optimization of EOSC 221: Introductory Petrology has begun to permeate other courses. Mary Lou Bevier, who is the lead on transforming EOSC 221, is also applying classroom engagement techniques in her other courses and is gathering midterm feedback from students about the results.

The oceanographers in the EOS department are conducting a parallel examination of the oceanography program curriculum and transformation of two core oceanography courses, using course and program learning goals (in progress) as a guide.

Four more courses are slated to begin the course transformation planning process in January 2008: EOSC 220: Introductory Mineralogy, EOSC 212: Imaging the Earth, EOSC 112: The Fluid Earth - Atmosphere and Oceans, and EOSC 210: Earth Science for Engineers. Faculty members involved are preparing to form working groups for those courses.

The EOS department is hosting internal, informal "Brown Bag Discussions" on a semi-regular basis. This term, Brown Bags have been held on the topics of (1) multiple choice exam questions, (2) on-line discussions as a learning tool, and (upcoming) (3) mid-term student feedback.