Poster session I: 11am-12pm (Board #s indicated next to titles)

Recent Developments in the Transformation of Statistics Courses with Highlights on Revisions to STAT 241/251 Labs - #2

Statistics: Gaitri Yapa & Bruce Dunham

We display here a brief summary of the courses being transformed as part of the involvement of the Department of Statistics with the CWSEI and the improved methods used during the past year. Highlighted are the results of approaches used to dispel students' misconceptions and the details of revisions made to computer-based labs. The improvements in student performance and feedback suggest the methods implemented can yield tangible benefits.

Five years of SEI in Earth and Ocean Sciences – #5

Earth & Ocean Sciences : Francis Jones & Brett Gilley

Since 2007, Science Education Initiatives (SEI) in Earth and Ocean Sciences have focused primarily (although not exclusively) on specific courses and their principle instructors. Currently, these "course transformations" are winding down, so this poster will graphically summarize changes to our courses, and outline several new initiatives that use a more ad-hoc "consulting" model.

A New Classroom Practices Observation Protocol -#6

Earth & Ocean Sciences: Francis Jones

A new observation procedure is being developed which aims to enable characterization of instructional practices, student actions, "Bloom's levels" and other classroom characteristics, on a timeline of the class. The intention is to develop a procedure that can be useful for characterizing any type of class without making judgments about "quality" in any sense. Examples of trials, and some possibilities for analysis, will be presented, including comparisons of different classes from one course, and single classes from 16 different courses.

Gender Gap and Gender Bias in Concept Diagnostic Tests - #9

Physics & Astronomy: Jim Carolan

There has been some debate within the physics education community about possible gender bias in physics diagnostic tests. We examine some concept diagnostic data from first year UBC students for evidence of a gender gap between relative performance on different concept tests as well as performance on other measures.

Transforming Traditional Large Lectures into Active Learning Environments - #11

Physics & Astronomy: Cynthia Heiner & Louis Deslauriers

UBC is committed to improving student learning in undergraduate physics by transforming their traditional large lectures into interactive classrooms. Instructors engage the students with challenging questions and tasks, which allow students to practice problem solving and reasoning skills. Here we report on two components introduced into several first-year physics courses: (i) pre-class assignments that are completed at home by the students online, and (ii) worksheets that are worked on in small groups in class.

CWSEI Activities in Physics and Astronomy - #14

Physics and Astronomy: Georg Rieger

I will present an overview of course transformations and other activities of the CWSEI in Physics and Astronomy.

The Transformation of Physics 315 - #15A

Physics & Astronomy: James Day & Vladimir Hinkov

An overview of the evidence-based pedagogical techniques recently adopted in a 3rd year physics elective course, Phys 315: Physics of Materials. Qualitative and quantitative measures of the successes and shortcomings of this transformation are presented.

Evaluating Interactive Activities by Measuring Student Learning Gain - #13A

Life Sciences: Malin Hansen

A key element in the design and use of interactive activities is to evaluate their effect by measuring student learning gain. I used a conceptual inventory to evaluate an in-class activity. The result from the first trial run was used to modify the activity to increase student learning.

Carl Wieman Science Education Initiative in Biology - #16

Life Sciences: Amanda Banet, Bridgette Clarkston, Malin Hansen, Lisa McDonnell, Jared Taylor, Laura Weir & Patricia Schulte

The Biology Program was recently restructured into a more streamlined program organized around a series of core courses, and CWSEI in Biology has been reorganized to reflect the new structure. Six Science Teaching and Learning Fellows with specializations relevant to each stream are working on projects in first-year biology, ecology, genetics, physiology, evolution, and the treatment of phylogenetic methods across the curriculum.

Effective Closed Labs in CPSC 121: Lessons from Eight Terms of Action Research – 18A

Computer Science: Steve Wolfman& Elizabeth Patitsas

Almost four years into ongoing action research on students' perception of CPSC 121 labs, we report on our methods, the kinds of questions they've enabled us to ask and answer, and how those answers have affected lab development. We have incorporated students into the lab development process regularly, e.g., including undergraduate TAs with recent course experience in leadership positions. We have streamlined and improved lab content repeatedly, e.g., identifying and replacing problematic tools. Critically, we have introduced sustainable practices to ensure labs continue to be delivered professionally and to respond to students' needs, such as a rigorous program of TA training and review of lab materials. We present examples of practices and evidence from our work under these themes.

Planning Assessment for a Game-Like, Highly Reusable Data Structures Assignment – #18B

Computer Science: Steve Wolfman

We have offered three version of a game-like project that engages students in disciplinary inquiry in CPSC 221. We now have substantial anecdotal evidence that the project is motivating to students, revealing as an assessment to instructors, and well-targeted at learning objectives. In this poster, we very briefly present the project and its advantages and seek feedback on developing high-quality assessments to study what students actually learn from the project.

The Carl Wieman Science Education Initiative in Mathematics - #20

Mathematics: Costanza Piccolo

An overview of CWSEI activities in the Mathematics Department at UBC.

Online homework in Mathematics using WeBWorK - #21A

Mathematics: Warren Code, Joseph Lo, & Costanza Piccolo

We have recently introduced online homework in a number of different first-year Calculus courses using WeBWorK, an open-source online homework system supported by the Mathematical Association of America and the NSF. We present a preliminary analysis of how our students interacted with the system and whether it supported learning.

A Calculus II Diagnostic that Identifies Gaps in Pre-requisite Knowledge - #22B

Mathematics: Greg Mayer

An in-class formative assessment was developed for a Calculus II course that covered pre-requisite Calculus I concepts. The diagnostic was administered in one section of a Calculus II course at the beginning of term; some diagnostic questions that challenged students were identified, and students who completed Calculus I recently out-performed their peers on the diagnostic and on midterm exams.

What Might Affect Student Performance in a Math Course? - #24A

Mathematics: Joseph Lo

Top students may not necessarily be brighter than lower performing students, but they tend to behave differently in numerous ways. Based on student performance, we attempt to identify some demographic, behavioural and psychological factors that might relate to the success in a calculus course.

Precalculus Skills - #24B

Mathematics: Joseph Lo

How important are precalculus skills for success in first year calculus? In this project, we study how different types of questions correlate with student performance in a two-term differential calculus course. We also present a preliminary analysis on how much remedial exercises can improve students' precalculus skills.

Poster Session II: 12:30-1:30pm (Board #s indicated next to titles)

Undergraduates' Perceptions of In-Class Active Learning Techniques in Science Lectures - #1B

CWSEI Central: Ashley Welsh

This poster presents the analysis of 260 open-ended survey comments that undergraduates wrote regarding the use of in-class active learning techniques in science & math courses at UBC. The analysis reveals students' positive, negative, or conditional perceptions of in-class active learning techniques & reviews students' suggestions as to how these techniques could be used effectively in lecture.

3 years of Improving Student Impressions of EOSC 331 - #3

Earth & Ocean Sciences: Brett Gilley, Ken Hickey & James Scoates

3 years of end of term surveys in EOSC 331: Mineral Deposits have shown student attitudes improving in several key areas related to the transformation of the course.

Invention Activities in an Introductory Lab: Minerals, Rocks, Biodiversity, & Earthquakes - #4

Earth & Ocean Sciences: Sara Harris & Brett Gilley

Invention activities provide an alternative to the more common "tell and practice" method of teaching. We developed 4 invention activities for an intro. Earth Sci. Lab; we present these & report on student results on pre/post assessment questions.

Physics & Astronomy TA Professional Development Program - #7

Physics & Astronomy: Natasha Holmes & Jonathan Massey-Allard

The Physics and Astronomy TA professional development program includes a 2-day workshop, a mentor program where senior-TAs mentor new TAs, and a course-specific training program where senior-TAs train all TAs on course-specific teaching issues. We will present details of this program, as well as some significant changes and improvements being made this year.

The Invention Support Environment: Where Do We Go From Here? - #8

Physics & Astronomy: Natasha Holmes

The Invention Support Environment (ISE) is a computer-based learning environment for working through invention activities to teach students data analysis skills in an undergraduate physics lab. We have used it previously to study the effects of metacognitive scaffolding on student learning and quality of student inventions. We now have a host of data including pre- and post-tests, inventions from 5 different topics, and several transfer activities, and we're not sure where to start. This poster will present the details of the ISE, some of the data we have yet to analyze, and ask for your expert advice about where you think we can go with this research.

Transforming the Physics 100 Labs – #10

Physics & Astronomy: Ido Roll

Transforming large enrolment labs has unique challenges. In this poster I (i) describe the transformed Physics 100 labs (ii) compare students' views of the lab on the final week vs. their reflection three months later, and (iii) compare students' views of the Phys 100 labs vs. other labs that they have taken across the Faculty of Science.

Developing Concept Inventories for Biology - #12

Life Sciences: Gulnur Birol, et al.

Students do not arrive in science classes as blank slates without any prior knowledge & beliefs about the discipline. They hold deeply rooted beliefs, ideas and misconceptions that may widely diverge from scientific consensus (Duit 2003). These fundamental misconceptions are often a significant barrier to learning. The goal of this project is to develop concept questions for biology that address common misconceptions in fundamental areas of biology, and are validated to help students focus their learning while helping instructors focus their teaching.

Restructuring Microbiology 325: Microbial Genetics – #13B

Life Sciences: Jared L. Taylor & J. Thomas Beatty

Recently, MUCB 325, a third year microbial genetics course, was completely restructured. Previously the course used a more traditional lecture and tutorial based learning model, but has now incorporated a much more interactive and active learning model. This new version of the course relies heavily on clearly defined learning objectives, pre-class readings, in-class group oriented clicker-based problem solving, and very little lecturing. A concept inventory was employed to measure the learning gains achieved by the students in the restructured course, with an average learning gain of ~50% being observed.

Ready! Set! React! Getting the Most Out of Peer Instruction with Clickers - #15B

Physics and Astronomy: Peter Newbury

With the right peer instruction choreography and some anticipation of how your students will vote, you have the opportunity to make every clicker question a "golden moment" where, right before your eyes, students learn. This poster illustrates one way to run an effective peer episode and gives options for reacting to students' clicker votes.

An Evidence-Based Transformation of a Computer Networking Course – #17A

Computer Science: Donald Acton & Allison Elliott Tew

CPSC 317, Internet Computing, is a 3rd yr elective course in computer networking that, using a combination of baseline student data and input from a faculty working group, has been transformed into a more student-centered classroom. Changes included making the learning goals more relevant to the needs of computer science students today and adopting a group activity-based classroom pedagogy. We include a progress report from the first offering of the newly design course.

Adapting the CLASS for Use in Computer Science – #17B

Computer Science: Allison Elliott Tew & Oliver Schneider

The Computing Attitudes Survey (CAS) is a newly designed instrument, adapted from the Colorado Learning Attitudes about Science Survey (CLASS), for measuring novice to expert-like perceptions about computer science. Following an iterative design process, validation & pilot testing began Fall 2011 (n = 478) & continued with full-scale (n = 501) pre/post term deployment Spring 2012. Initial findings show consistent interpretation of statements by faculty and students, establish expert consensus opinion &identify 8 candidate factors for further analysis.

Computer Science SEI: An Overview – #19

Computer Science: Paul Carter & Allison Elliott Tew

We present an overview of the range of activities undertaken by the Computer Science department as part of its engagement with the CWSEI. We include work on student attitudes, large scale course transformations, a new sequence of introductory software design courses & smaller scale efforts to renew existing courses.

Mathematics Attitudes and Perceptions Survey (MAPS) - #21B

Mathematics: Warren Code & Joseph Lo

Student perceptions of mathematics play a role in their motivation and approaches to learning. We present our adaptation of an existing survey for Physics (the C-LASS) used to survey students in a range of Math courses, allowing us to assess student attitudes & perceptions relative to those of experts, and to track how they shift over time.

Teaching Methods Comparison in a Large Introductory Calculus Class – #22A

Mathematics: Warren Code

We present preliminary results of a comparison of teaching methods implemented in a first-year calculus course. Student performance on conceptual parts of our assessments, including quizzes and items on the final exam, was higher for the sections which had pre-class reading assignments and much more class time devoted to students working with mathematics, while performance on more computational parts was similar.

Math Course for Future Elementary Teachers at UBC – #23A

Mathematics: Katya Yurasovskaya

Mathematics for future elementary teachers is one of the most challenging courses to teach. This poster describes knowledge of incoming students, their expectations and beliefs - and lists recommendations for content and course structure, assembled as part of CWSEI project. Data comes from semi-structured interviews and a diagnostic test, designed by CWSEI as an aid for instructor of the course.

Workshops and the First Course in Mathematical Proof – #23B

Mathematics: Katya Yurasovskaya

First course in proof serves both as a gateway to pure mathematics and as an introduction to writing and understanding mathematical proofs for the first time in the students' academic life. The transition to mathematical abstraction is abrupt, presenting students all at once with challenging material, expectations of mathematical rigour, large amount of mathematical formalism and new notation, as well as demands for clear and precise writing. This poster describes a system of interactive problem-solving workshops which provide a place for feedback, targeted practice, and interaction, easing students' transition into formal mathematics.