

Summer 2013

Undergraduate Research Report

Online Educational Resources for Incoming First Year Calculus Students

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This project, funded by UBC's Teaching and Learning Enhancement Fund under the title "Online Educational Resources for Incoming First Year Calculus Students", aims to design and implement a pre-calculus course designed to aid first year calculus students prior to or during their first course at UBC. It is based on a similar course from the University of Michigan. Sebastian has been hired as a UBC Co-op student (Computer Science) for Summer 2013.

Technologies used to deploy course content:

- WeBWork hosted by the main CTLT WeBWork server
- UBC Connect (Blackboard LMS)

Course content:

- Course modules created with the following web technologies under the SCORM standard:
 - HTML 5, Javascript and LaTeX (MathJax.js)
 - This is used to create content: text, equations, interactive questions, applets, embedded videos and images.

Module structure:

- Learning goals categorized by subtopic and grouping subtopics into topics.
- WeBWork test definition files created based on these categorizations.
- Course modules are uploaded as SCORM packages to the LMS (zip files).
- WeBWork tests are linked using the LTI tool found in Connect.
- Menus for each subtopic are done using a Blank Page with embedded Course Links in Connect
- All modules are connected using a general "welcome page" that displays students grades and provides links to the topics. This page adjusts according to the initial diagnostic test and updates as students progress in the course (indicated by subsequent WeBWork performance).

Student view:

- Students self-enroll in the UBC Connect course that is open to anyone with a CWL .
- The LMS contains the SCORM-compliant lessons, and tracks student usage via the SCORM reports: time spent and completion for each of the lessons.
- Section tests and overall diagnostic are handled by WeBWork. Data files will exist that link learning objectives to WeBWork problems. Scores will be reported back to Blackboard via the new LTI connexion. The usual WeBWork data is logged: logins and response records; these could be matched up via external scripts to the LMS data.
- The core navigation tool for students in Connect is a "study plan" or "Welcome Page", a Blackboard Building Block that uses the information in the Grade Book to display course progress and suggest next review topic (students have access to all topics at all times if they want to make their own plan).

More details are available at the project site on the Math/Stat project server: <https://trac.stat.ubc.ca/precalc/>