

CWSEI-PHYS and ASTRO Newsletter

May 2010

Our department has always been committed to high standards in education. Recently, with support and leadership from the Carl Wieman Science Education initiative, we have made increasing progress in successfully implementing research based educational methods in our classrooms. An increasing number of faculty are showing a keen interest in these developments. In response, we will periodically distribute this newsletter to keep you up-to-date with the latest CWSEI efforts.

Phys107/109 – the lab offered with our enriched 1st year courses, Phys107 and Phys108 and ScienceOne – is the first lab to undergo a complete transformation under the leadership of Doug Bonn, with help from CWSEI STLF James Day. They spoke about this experience in a colloquium earlier this year, and will also be featured here in a future edition. In this edition, we share quotes from students and TAs involved with this lab, regarding their views and experiences.

Mona Berciu

Amy So Jeong Choi, Science One student:

First of all, I enjoyed the phys lab. The reason I liked this course is that it was very different from my expectations. The lab course that I expected was something where we would be given clear instructions and would be guided to find "the" solution to questions in the end. However, there was no specific SOLUTION in this lab course. Since all the questions given to us required creativity and thinking outside of box, and since each individual has different thoughts/views, each person approached questions differently. Also, by working with different partners rather than either working alone or working with the same partner, I could explore other people's creative thoughts and share each other's ideas, and was able to eventually come up with the best answer, the combination of my partner's and my thoughts. Each lab I worked with different partners and approached a question differently. In this lab, not only was I able to understand physics material better, but I was also able to develop my learning skills, thinking process, and creativity. I learned various things at once just by taking phys 107/109 lab.

Andy Tan, Science One student:

The unique inventions activities of the PHYS 107/109 lab courses allowed for plenty of interactions with my classmates, which I enjoyed. The openness of the lab set it apart from the other more structured lab courses that I've taken. In this learning environment, I was better able to practice the data-analysis skills taught in the class.

Brad Ramshaw, graduate student and TA for Phys107/109:

I was enrolled in the Science One program at UBC in 2003/2004, so I am in the unique position of having taken the course before its transformation and having TA'd the course during and after the transformation. The original course was based on a recipe style lab book, where students were expected to copy out pages of Mathematica code and battle with Mathematica's formidable syntax while trying to perform an experiment at the same time. As many of my friends in the Science One program quickly learned, unless you had prior programming knowledge and a great desire to learn a new language, the easiest way through the lab was to find a savvy friend and let him or her do all the work. For students who were not going on in physics or computer science, there was very little value in the lab, and it was a source of great frustration for them.

The new lab has shifted the focus away from learning a specific (and rather daunting) tool, and on to more the general skills of how to take good data, how to determine the uncertainty in your measurements, and how to compare the data in a meaningful way with models. The lab is now accessible to all students, with no assumptions of "prior knowledge", and students who plan to go on in disciplines other than physics now have something to take away from the lab.

In comparison to the lab 8 years ago, when the students were focused on frantically copying out code and debugging the syntax, the present lab allows students time to plan how they want to approach the experiment. There are a lot less "why won't this code work!?" questions, and a lot more "Do you think this is the right way to proceed?" questions, which shows that they are conscious of the fact that the lab can be approached in more than one way, and that some ways might be better than others.

Julian Pradinuk, Science One student:

PHYS107 and 109 were challenging in that we were left to our own devices for many aspects of the labs performed. This was definitely an adjustment at first but I gradually felt more and more comfortable with the required tasks. The labs built on each other and by the end of phys 109 I felt I had an array of new skills available to me – mainly data taking and analysis methods. The best part of these first-year physics labs was the group work. We were always grouped with at least one other student. I learned how to work with my peers and a lot about how others think, seeing problems in different ways than I would normally see them.

PHYS-ASTRO Science Education Research Team