

Faculty	Science
School	School of Mathematics and Physics
Activity	Flipped Classroom
Lead	Professor Michael Drinkwater, Professor Matthew Davis and Professor Tamara Davis
Course	Mechanics & Thermal Physics I PHYS1001
Average no. of students	230

The course

- This course is designed to teach basic physics, conservation of energy and momentum, rotational motion, fluids, microscopic basis of pressure and temperature, thermal physics, basic heat engines.

Flexible and Active elements

- An interactive approach to active learning was implemented by flipping the classroom, lecture style. The chief goal being to engage and support students in the learning process, to ensure accuracy and competence in application of foundational knowledge.
- The approach has two phases: 1) pre-class preparation and 2) in-class active learning. Students are required to complete pre-reading. Comprehension is then checked through pre-lecture quizzes (online short written answer) which is then analysed by software to identify key learning issues. The lecturer also selects responses for discussion in class. Lectures incorporate clicker questions to facilitate discussion.
- Pre-reading exercises form part of the overall assessment with marks awarded for effort rather than correctness.
- A purpose built software was developed to extract and consolidate the short answer responses into themes to assist the lecturer in formulating discussion topics for the lecture.
- Read more about the process here.

Learning outcomes

- Course coordinators have measured learning gains of students for the last six years using an international benchmark test. It shows that students are consistently learning almost three times as much as in conventional classes.
- Student feedback highlights appreciation for the interactive nature of the course.

“ What the students say

I think it helps us learn faster because we don't spend the lecture time looking through the book... we have already done that. We refine our understanding in the lecture and instead of just trying to understand it to start with, it saves time and we get more work done in a shorter amount of time. The reading quizzes help us to focus the learning from the pre-reading because some time the text is a bit wordy.

Students pointed out how valuable it was when the majority got an answer wrong and so the lecturer could intervene to address their misunderstanding. This was particularly true when they had been very confident of the wrong answer: "That's when I learn the most. That is revolutionary."

The active learning process really worked for the course and I think I understood the concepts better for it. I was also amazed the times I got individual responses to the reading quiz feedback forms; dedication from the lecturers!

The active learning in this course was an incredibly clever way to get students engaged and keep us from slipping too far behind. Reading quizzes and mastering physics were also helpful in staying on track and thinking about the concepts taught in class.