

Project Year

2013-2014

Project Title

Enhanced opportunities for individualized student learning & faculty feedback in *Molecules and Cells*

Project Team

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Audience

This project is designed to initially be for students in *Molecules and Cells* (580.221), a required Biomedical Engineering course taught primarily to sophomores, with some freshmen enrolled.

Pedagogical Challenge

As *Molecules and Cells* is currently structured, students with less experience studying biology may be at a disadvantage. It is a fast-paced and rigorous core course and those students who have not taken AP Biology in high school, or who have less exposure to the subject, often find themselves overwhelmed by the rapid accumulation of material.

Solution

By developing video lectures, animations, and online quizzes that focus on understanding the fundamentals and key ideas of each topic, we seek to help students better understand the subject material and keep up with the class. We are also creating a bank of weekly “clicker” questions to be used by faculty at the beginning and middle of each lecture. These questions provide immediate feedback to faculty on student readiness and understanding.

The proposed technology suite will help students really understand the fundamentals of each topic – a sort of “ground-up” approach. Students who have less exposure to biology classes may feel like they are being thrown into an advanced topic before they have ever studied the nuts and bolts. We will develop the online resources necessary for every student in the class to get up to speed on the key ideas of each lecture, presented in an easy-to-digest manner. When combined with quizzes and test-like questions with immediate feedback, these simulations and videos will hopefully help students better understand and keep up with the course material.

Faculty Statement

In *Molecules and Cells*, the main concepts of cell biology and biochemistry are taught from an engineering perspective. It is fast paced, very challenging core BME course. Subject material from *Molecules and Cells* is often referenced by professors from upper level courses, and it is important that every student leave the course with a solid foundation. Last year we received a CER Technology Fellowship to develop a suite of online videos which provide background information on lecture topics. These short (less than five minute), easy-to-understand videos were extremely popular, as judged by the number of “hits” using Blackboard’s statistics tracking, and based on student feedback. In particular, students who had weaker backgrounds in cell biology stated that they repeatedly viewed these videos,

both before and after lecture, to clarify the main concepts. We are applying for another CER Technology Fellowship to provide additional resources in the form of online quizzes, simulations, animations, and additional videos. We also plan to develop a bank of clicker questions that can be used to poll our students about their understanding of the course material, providing immediate feedback to the faculty.

We believe that a mix of traditional lectures, self-paced online resources, team-based learning, and clinical case studies will lead to better long-term retention of the material for all of our students. We first included team-based learning activities in 2010, and added the online background videos in 2012, both of which have been very successful. Effective team-based activities require that students thoroughly comprehend the course material to fully participate in group discussions. Adding more videos, simulations, and online quizzes will allow our students to learn at their own pace. Requiring students to complete an online quiz prior to lecture will help ensure that students are prepared for both the pace of the lecture material and team-based learning activities.