## Project Year

2016-2017

## Project Title

Biomaterials II Conceptual Animated Videos

## Project Team

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## Audience

The audience is Materials Science & Engineering, Biomedical Engineering, and Chemical & Biomolecular Engineering junior and senior undergraduate students taking Biomaterials II.

## Pedagogical Challenge

*Biomaterials II* is a course that teaches from *Biomaterials I*. The content from the previous course is summarized in a quick manner for the first quarter of the class because those topics are important core concepts. However, because *Biomaterials I* is not a pre-requisite for *Biomaterials II*, there are students who come from a variety of backgrounds who may not have had exposure to this material. Therefore, there is a need for these students to efficiently learn this material.

Other content taught in this course consists of multi-step processes that are either industrially or biologically oriented. Currently, these are taught from two-dimensional static images. While instructive, these diagrams typically have the entire process laid out in a manner that may be confusing and unclear to students encountering the material for the first time. Thus, there is a need to ensure that the students are understanding the material.

## Solution

The solution is to create informative animated videos for both general concepts from Biomaterials I and important processes in the course. Video format is ideal because of the possibility of incorporating visual, audio, and temporal elements. The animations will be beneficial overall for instructive purposes, as they will engage both visual and auditory learners. The temporal element will be especially helpful in explaining multi-step pathways in a manner that is sequential and not overwhelming.

For example, complement activation is an important concept with a large number of molecules, factors, and steps. There are many cascading events involved that are known to be a part of the body's immune response to pathogens. It can be challenging to comprehend the process as a whole. The goal of the videos would be to provide an overview of the concept that would be helpful as both an introductory and review resource.

## Assessment Strategy

The impact of the resource will be evaluated in several ways. Statistics collected in Blackboard can be used to see how many times a video is viewed. An anonymous comment section will be available for students to provide their thoughts on each video and any suggestions for how it may be improved.

Student feedback will be obtained from surveys at the end of the semester to see if they perceived the videos to be a helpful resource. Also, there will be survey questions asked before and after the video to see if they perceived any differences with their understanding, experience, and confidence. If possible, a comparison of student grades from previous iterations of the course will be done to see the impact this resource has.

## Faculty Proposal

This animation production project serves to smooth the transition from EN.510.316 *Biomaterials I* to EN.510.407/607 Biomaterials II, and to visualize several abstract concepts in *Biomaterials II*. *Biomaterials II* features the interplay of polymer science, materials chemistry, materials physics, biology, and medicine. Animations from online resources such as YouTube have been used to demonstrate complex processes such as complement activation and wound healing. However, the downsides of these videos are manifold. Besides the fact that they often contain irrelevant information and use different terminologies, these videos can't be modified to meet the needs of our lectures. Also, the online videos are mostly non-archival information for downloading and reference, which is inconvenient for future students in *Biomaterials II*.

Animations from our own students can instead tackle the concepts in *Biomaterials II* directly, accommodate modifications including pre- and post-video questions, and facilitate archiving and sharing through Blackboard. The animations produced throughout the project are applicable to relevant courses in Biomedical Engineering, Chemical and Biomolecular Engineering, and Biology as well. For example, animations regarding cell-cell and cell-matrix interactions in *Biomaterials II* can be shared with courses like *Cell Biology, Molecules and Cells, Tissue Engineering*, etc. Beyond benefitting academic courses, making animations also encourages students to create schematic illustrations of complex concepts, an essential skill in contemporary scientific research.

The completion of this project requires the preparation and display of at least three *Biomaterials II*-related animations in class. To evaluate this project, undergraduate students will be asked to give a score of 1–10 based on the helpfulness of the videos, their opinions on the benefits and weaknesses, and their suggestions on how to improve the animations for future students.