Spring 2020

College of Natural Sciences, Forestry, and Agriculture_COVID-19 Courses for Molecular & Biomedical Sciences

University of Maine College of Natural Sciences, Forestry, and Agriculture

Adapted course design for Spring 2020 to include COVID-19 pandemic content:

- Maginnis, BMB598 Advanced Virology course: a graduate course in molecular virology and viral pathogenesis; included course content on viral emergence and zoonotic transmission of SARS-CoV-2, structured analytical exercise to investigate antiviral and vaccine development for COVID-19, inclusion of SARS-CoV-2 updates and research articles and discussion regularly in class, a science communication in social media project surrounding communication of COVID-19 pandemic

- Maginnis, BMB580 Seminar in Microbiology course: a science communication in social media project surrounding communication of COVID-19 pandemic

- King, BMB 402/502 Introduction to Bioinformatics: an upper level undergraduate (7 students), and graduate (26 students) course in bioinformatics. Every class began with a status update of the number of sequenced SARS-CoV-2 genomes, and a discussion of sequence variants found. These data were visualized over time and location to examine transmission across the globe. The number of genomes increased from 13 from the first class in January to over 12,000 genomes at the last class, We also discussed the Oxford Nanopore and Illumina sequencing platforms that were used to characterize these viral genomes.

- Gosse, BMB 360 Biochemistry for Molecular and Biomedical Sciences: information about the pandemic was worked into the course as relevant topics arose, such as vitamin D in the lipids chapter (discussion of intriguing studies of vitamin D status affecting disease progression), etc.

- BMB155, Genome Discovery, Michael Wilczek (basically all Michael) and Melody Neely: the beginning of the lectures on Fridays encompassed the latest news on COVID-19 and how the virus properties were similar to what we were studying in Phage life cycles.

- Bernard, BMB 420 Infectious Disease, BMB 415 Microbiology of Historical Plagues, and BMB 430 Bacterial Physiology: Dedicated one full course period in each to answering questions, discussing current research, and CDC recommendations for preventing spread of the disease. For BMB 415, allowed students to change their paper topic to discuss the microbiological, social, and economic factors that led COVID-19 to reach pandemic status and the likelihood of future outbreaks.

- *Not an actual course, but Melissa Maginnis served as a panelist for BioME Science of COVID-19 webinar, which can be viewed on demand: https://us02web.zoom.us/webinar/register/rec/WN_10iwqlilTIWfXvWvTNHASA?meetingId=1O5bAIH2-zJIbq_0zkWcc6FwIYa6aaa82nMb_PMNxEhfR3j3qq7qacf-vysbn50K&playI

d=&action=play&_x_zm_rtaid=UJpmGDI4RvKvaakxxVXk4A.1591158621663.8b3647fe8b8cc643c6a1444e09a27222&_x_zm_rhtaid=348

- Melissa Maginnis also generated this virus-related podcast on The Maine Question: https://umaine.edu/news/blog/2020/04/13/the-maine-question-podcast-looks-at-why-viruses-go-viral/

Course Content for Summer 2020:

- Bernard, BMB 240 Microbiology for the Professional Nurse and BMB 300 General Microbiology: Created a literature search assignment asking students to describe microbiological characteristics of the virus (i.e. virion structure, Baltimore class, etc.), viral replication cycle, current treatments, potential vaccine candidates, and prevention methodologies. The report replaces half of the final exam grade.

Planned courses or course content on COVID-19 for Fall 2020:

- Maginnis, BMB490 Microbial Genetics course: a research-intensive, writing-intensive course will be modified to include content on basic virology, viral genetics, viral pathogenesis, viral emergence and zoonotic transmission of SARS-CoV-2, antiviral and vaccine development for COVID-19, dissection of primary research articles and ethics-related discussion, and a science communication in social media project surrounding communication of COVID-19 pandemic. As an experiential learning experience, students will possibly explore SARS-CoV-2 isolate sequences and design a project related to tracking zoonotic transmission or global spread and transmission.

- Gosse, BMB467 Physical Biochemistry. After learning and problem-solving fundamental concepts of physical biochemistry, this knowledge is applied to student presentations of biophysical techniques and how those are used to answer biomedical questions. Some students will choose to study a COVID-19 application of their biophysical technique, such as super-resolution microscopy to study SARS-CoV-2 membrane proteins or fluorescence polarization to study drug binding to viral proteins. Students will present their findings orally/visually (powerpoint) to the class.

- Bernard, BMB 300 General Microbiology: Will refine a literature search assignment asking students to describe microbiological characteristics of the virus (i.e. virion structure, Baltimore class, etc.), viral replication cycle, current treatments, potential vaccine candidates, and prevention methodologies. An additional narrated PowerPoint lecture will be produced and assigned focusing solely on the virology of COVID-19 and covering the above aspects in detail.

Planned courses or course content on COVID-19 for Spring 2021:

- King, BMB 402/502 Introduction to Bioinformatics: an upper level undergraduate , and graduate course in bioinformatics. Students will learn about how high-throughput sequencing technologies have been used to track transmission of SARS-CoV-2, learn how to compare genomes to find sequence variants, and analyze those variants to learn about how they may alter host-pathogen interactions.

- Bernard, BMB 420 Infectious Disease and BMB 415 Microbiology of Historical Plagues: Students will be given the option to choose COVID-19 for their oral presentation (BMB 420) or the topic of their paper (BMB 415). Additional primary literature articles will be assigned for discussion of COVID-19 virology, prevention, treatment, etc.