BIOL 6810, CSCE 6810, MATH 6710
Advanced Topics in Computational Life Sciences
Topic: Modeling and Analysis of Viral Pandemics

Course Information & Syllabus (Fall 2020)

Instructor: Rajeev K. Azad
Lectures/Seminars: Monday, 6:30 – 9:20 PM (Remote via Zoom on Canvas)
Office Hours: Friday, 8-9 AM, 1-2 PM (Remote via Zoom: https://unt.zoom.us/j/2298672063) or by appointment
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Required Textbook: There will be no required textbook. The course will be based on published journal and conference articles.

Course Objective: This course focuses on current topic of viral pandemic modeling and analysis. The ongoing coronavirus pandemic has affected almost all countries in the world. With over half a million deaths and still counting, and a large-scale economic downturn worldwide, government and private organizations are making all-round efforts to mitigate the impact of the pandemic. The decision-makers rely on science to guide them through such crisis. Mathematical and computational models have been developed to simulate and predict pandemics, which are continually improved upon and become increasingly reliable as more pandemic data are incorporated as they become available. On the other hand, because of the advances in omics technologies, comprehensive pathogen modeling and analysis enable understanding of the mechanisms of the infectious disease that aid in the development of precision diagnostics and therapeutics. Molecular data from pathogens are also utilized in their characterization and in understanding their emergence and evolution.

The primary objective of this course is to explore the literature on viral pandemic modeling, including the research articles on current coronavirus crisis, present and discuss the latest developments in the field, and participate in projects (in team or individually) motivated by problems from this field. Both state-of-the-art as well as emerging novel methodologies in pandemic modeling will be discussed, specifically in the context of their applications to address COVID-19 caused by novel coronavirus SARS-CoV-2. This will encompass both the spatiotemporal and genome epidemiological models, as well their combination. Students will learn the basic as well as advanced mathematical and computational models underlying methods used in epidemiological studies and explore their use in addressing current COVID-19 problems. To achieve this goal, students will present and discuss research papers that describe the development and use of models and techniques in viral epidemiology. These papers will form the basis for investigative research projects using the methodologies presented in these papers to address viral pandemics, including the novel coronavirus problem.

Assessment is primarily based on paper presentations (45%), project work and written reports (30%), and class participation─ attendance and discussions (25%).

Attendance: Attendance is essential and thus is expected.

Americans with Disabilities Act: We cooperate with the Office of Disability Accommodation to make reasonable accommodations for qualified students (cf. Americans with Disabilities Act and Section 504, Rehabilitation Act) with disabilities. If you have not registered with ODA, we encourage you to do so. If you have a disability for which you require accommodation please discuss your needs with the instructor or submit a written Accommodation Request on or before the fourth class day.