

CSC 539-201 Computational Epidemics Summer 2022

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Catalog Description

CSC 539 (3 Hours) Computational Epidemics. The course will provide a detailed theoretical analysis of the prominent epidemic spread models such as the SI, SIS, SIR and SIRS models, and conduct simulations of their behavior in general population as well as a graph-theoretic setting. The course will cover algorithms and metrics for effective vaccination to contain the spread of diseases. The course will also examine the use of machine learning algorithms in predictive analytics of epidemic data.

Pre-requisite: Graduate student status or a Senior in Computer Science/Computer Engineering

Course Outcomes

Each student who successfully completes this course should be able to:

CO-1: Theoretically analyze the basic compartment models such as SI, SIS, SIR and SIRS for epidemic spreading.

CO-2: Simulate the working of the compartment models in a general population setting as well as in a graph/social networks setting, and study/analyze the results.

CO-3: Explore efficient and effective strategies for vaccination and testing.

CO-4: Explore the use of machine learning algorithms to predict the onset of a disease using the past data.

Textbook

E. Kuhl, "Computational Epidemiology: Data-Driven Modeling of COVID-19," 1st Edition, Springer, ISBN: 3030828891, 2021.

Course Modules

Module 1: Compartment Models: Theory and Analysis

Module 2: Graph-based Simulations and Analytics

Module 3: Vaccination and Herd Immunity

Module 4: Machine Learning-based Predictive Analytics

Module 5: Miscellaneous: Group Testing for Epidemics, etc

Evaluation: Exams – 100% (5 Exams, each 20%)

Tentative Exam Dates: June 29, July 6, July 13, July 20, July 27

Grading

90 - 100: A 80 - 89: B 70 - 79: C 60 - 69: D Below 60: F

Course Website: Canvas

Maintaining Registration Status

- It is the duty of the student to make sure that he/she stays registered in the course throughout the semester. If a student sees he/she is dropped from the course without his/her knowledge, the student should notify the instructor before the next meeting of the class.
- A student cannot attend a class or take an exam/quiz if the student is not registered for the course at that point of time.

ADA Statement

Compliance with the Americans with Disabilities Act: If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and ADA Coordinator (as early as possible in the term) located in the Jacob L. Reddix Building (old student union), rooms 101 and 102. The office hours are: 8:00 a. m. to 5:00 p.m., Monday through Friday. The telephone number is (601) 979-3704 or (601) 979-

6919 (TTY) and the facsimile number is (601) 979-6918. The mailing address is: Office of Support Services for Students and Employees with Disabilities, P.O. Box 17156, Jackson State University, Jackson, MS 39217.

Diversity Statement

Jackson State University is committed to creating a community that affirms and welcomes persons from diverse backgrounds and experiences and support the realization of their potential. We recognize that there are differences among groups of people and individuals based on ethnicity, race, socioeconomic status, gender, exceptionalities, language, religion, sexual orientation, and geographical area. All persons are encouraged to respect the individual difference of others.

Collegiate Code of Conduct

Jackson State University students are expected to dress in a manner representative of higher education institution. More information on Dress Code; Verbal and/or Physical Harassment; Indecent, Obscene, Immoral Behavior and/or Profanity is available in the JSU Student Handbook. The most recent version of JSU Student Handbook is available at <http://www.jsu.edu/studentlife/pdf/2010book.pdf>

Student Conduct and Class Attendance Policy

Students at Jackson State University must fully commit themselves to their program of study. One hundred percent (100%) punctual class attendance is expected of all students in all scheduled classes and activities. Instructors keep attendance records and any absence for which a student does not provide written official excuse is counted as an unexcused absence. Students must understand that even with an official excuse of absence, they (students) are responsible for the work required during their absence.

Students may be officially excused from class for attendance at University approved functions, provided the sponsor properly executes a Student Affairs Leave Form. Such excuses shall be accepted by the instructor. Students may also be officially excused by the Dean of their School or the Vice President for Academic Affairs for certain campus activities. Students must submit written documentation to Student Affairs to obtain official excuses for absences due to illness or other emergency situations.

Students who willfully miss class face serious consequences. After being absent three times in a 50-minute class, three hours in a class that meets longer than one hour, or one time immediately before or after a scheduled recess/holiday, the instructor shall report the next unexcused absence to the Dean of University College for freshman and sophomores and to the school dean and department chair for juniors and seniors. The dean/chair or designee will counsel with the student and in concert with the instructor, may require the student to complete complementary course assignments. If a student does not respond well to the counsel or with the assignments, the instructor may impose a grade penalty on the student. Unexcused absences that exceed the equivalency of six 50-minute Sessions may lead to an "F" for the course.