Syllabus Fall 2024

BINF 701-002/BINF DL1 701 - Systems Biology

George Mason University, Bioinformatic and computational biology

INSTRUCTOR: Aman Ullah.
Locations/times: Lecture: Tuesday 4:30-7:10 p.m., PW: Colgan 304B & DL (Zoom's link is available on the blackboard i.e., Web Conference- Zoom)

Phone: (703) 993-7182; Email: aullah3@gmu.edu
Office Hour: Tuesday: 10:00 PM-1:00 PM or by appointment through Zoom's Link

Prerequisite

Admission to the Ph.D. program in biosciences or bioinformatics, BIOL 583/CHEM 563 or equivalent.

Course Objective

This course explores the principles of systems biology, an interdisciplinary field that seeks to understand complex biological systems by analyzing the interactions and relationships between their components. By integrating biology, computer science, engineering, bioinformatics, and other disciplines, systems biology aims to:

Predict system behavior over time and under various conditions

Develop solutions to pressing health and environmental challenges

Drive innovation in biology-based technology and computation

Through the use of computational methods and models, we will integrate information from multiple scales and methods to understand complex biological systems. Current research examples will be used to illustrate and motivate these approaches, highlighting the potential for new explorations and innovations in the field.

TEXTBOOK

A first course in system biology (2nd Edition) by Eberhard O. Voit (ISBN-13: 978-0815345688**).** s the primary textbook for this course. You can purchase it at the GMU bookstore or on Amazon.com (Amzon's Link). While the lecture material will primarily be drawn from this textbook, additional topics will be covered using other resources.

Grading Policy

The course grade will be determined as follows:

Activities:	**Percent of Final Grade:**
Homework:	25%
Mid-Term:	25%
Final Exam:	30%
Final Project:	20%

Grades are assigned on the following basis:

90 to 100%: A;

80 to 89.99%: B;

70 to 79.99%: C;

60 to 69.99%: D;

Less than 60%: F.

Attendance and Participation

Regular attendance and active participation in class lectures, both in-person and via Zoom (for DL section), are expected and highly encouraged. To get the most out of this course, students are responsible for:

Attending all scheduled lectures during class time.

Actively participating in class discussions and activities.

Proactively reading assigned references and materials mentioned in class.

By doing so, students will be well-prepared to engage with the course material, ask informed questions, and contribute to a productive and collaborative learning environment.

Academic Integrity Policy:

Academic dishonesty, including cheating, plagiarism, and falsification of academic records, will not be tolerated in this course. Any instances of academic dishonesty will be addressed accordingly.

However, collaboration and seeking help from peers is encouraged. You are allowed to:

- Discuss homework assignments with classmates
- Seek help and guidance from peers
- Work together to understand course concepts

But remember, copying someone else's work or submitting it as your own is not acceptable. All submitted work must be original and written in your own words.

Student Services

Disabilities

Disability Services at George Mason University is committed to providing equitable access to learning opportunities for all students by upholding the laws that ensure equal treatment of people with disabilities. If you are seeking accommodations for this class, please first visit http://ds.gmu.edu/ for detailed information about the Disability Services registration process. Then please discuss your approved accommodations with me. Disability Services is located in Student Union Building I (SUB I), Suite 2500. Email:ods@gmu.edu | Phone: (703) 993-2474. If you have a documented learning disability or other condition that may affect academic performance you should: (1) make sure this documentation is on file with Office of Disability Services.

Mason Live/Email

As a George Mason University student, it is your responsibility to:

- Activate your Mason email account
- Check your email regularly for important updates

All official university communications, including messages from the university, college, school, and program, will be sent exclusively to your Mason email account. This includes important announcements, deadlines, and notifications.

University libraries

University Libraries provide resources for distance learning students [See Library website: http://library.gmu.edu/for/online].

Tentative Course Schedule

Lecture 1, Aug 27th

Chapter 1: Biological Systems

Lecture 2, Sep 3rd

Chapter 2: Introduction to Mathematical Modeling

Lecture 3, Sep 10th

Chapter 2, and Chapter 3: Introduction to Mathematical Modeling and Static Network Models

Lecture 4, Sep 17th

Chapter 3: Static Network Models

Lecture 5 Sep 24th

Chapter 4: The Mathematics of Biological Systems

Lecture 6, Oct 1st

Chapter 4-5: The Mathematics of Biological Systems, parameters estimation

Lecture 7, Oct 8th

Midterm

Lecture 8, Oct 15h

Fall Break (Classes do not meet this week)

Lecture 9, Oct 22nd

Chapter 8: Metabolic Systems

Lecture 10, Oct 29th

Chapter 9: Signaling Systems

Lecture 11, Nov 5th

Election Day (Classes Do Not Meet)

Lecture 12, Nov 12th

Chapter 13: System Biology in Medicine and drug development

Lecture 13, Nov 19th

Chapter14: Design of biological systems

Physiological Modeling: The heart as an example/Fundamental of Calcium signaling

Lecture 14, Nov 26th

Final Projects: presentation

Lecture 15, Dec 3rd

Final Projects: presentation

Lecture 16, December 10th

Reading week

Final Exam, December 17th @ 4:30 PM.

Changes if needed will be announced in the class.