Syllabus Fall 2025

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 Canvas)

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 introduces the principles of systems biology, an interdisciplinary field focused on understanding complex biological systems through the analysis of interactions and relationships among their components. By integrating concepts from biology, computer science, engineering, bioinformatics, and related disciplines, systems biology seeks to:

- Predict system behavior over time and under varying conditions
- Develop solutions to critical health and environmental challenges
- Drive innovation in biology-based technologies and computational approaches

Using computational methods and modeling, students will learn to integrate data from multiple scales and methodologies to gain a holistic understanding of biological systems. Real-world research examples will illustrate these concepts, inspiring exploration and innovation in the field.

TEXTBOOK

A first course in system biology (3rd Edition) by Eberhard O. Voit (ISBN-13: **978-1032515434)** is 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 are essential for success in this course. Students are expected to attend all scheduled lectures—whether in-person or via Zoom (for the distance learning section)—and to arrive prepared to engage with the material. This includes:

- Attending class on time and staying for the full duration.
- Contributing to discussions and group activities.
- Reading all assigned references and materials before class.

By maintaining consistent attendance and active engagement, students will be better equipped to ask informed questions, collaborate productively with peers, and deepen their understanding of the subject matter.

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.

Policy on the Use of AI Tools

Artificial Intelligence (AI) tools (e.g., ChatGPT, GitHub Copilot, Grammarly, QuillBot, and similar applications) can be valuable for learning when used appropriately. In this course, AI use is regulated to ensure it supports, rather than replaces, your own work and critical thinking.

✅ **Permitted Uses:**

- Clarifying concepts or reviewing material covered in class.
- Improving grammar, spelling, or clarity in your own writing while maintaining your original meaning.
- Creating practice problems or questions for study purposes.

❌ **Prohibited Uses:**

- Submitting AI-generated text, code, images, or other work as your own without attribution.
- Using AI to complete any graded assignment, quiz, or exam, unless explicitly permitted by the instructor.
- Uploading course materials (assignments, tests, lecture slides) to AI platforms.
- Using AI in ways that bypass the learning objectives of the course.

⚖️ **Academic Integrity:**

Any unauthorized use of AI tools will be treated as an **academic integrity violation** and addressed according to university policy.

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.

Student Support Resources

Your success in this course is supported by a variety of campus resources. These services can help you manage academic, personal, and professional challenges. Whether you are a new, transfer, or first-generation student—or simply unfamiliar with what is available—please take advantage of the following:

- Student Support and Advocacy Center (SSAC)
- Counseling and Psychological Services (CAPS)
- Learning Services Office / Tutoring
- University Career Services
- University Labs: Writing Center and Communication Center

Accessing Resources:
Information and links to these and other support offices can be found on the university's Student Support Resources on Campus page (https://stearnscenter.gmu.edu/knowledge-center/knowing-mason-students/student-support-resources-on-campus/). I strongly encourage you to reach out early—whether you need academic guidance, personal support, or career advice. Seeking help is a valuable skill and an important part of your growth as a learner.

Privacy and Sharing Policy for Class Video Recordings

As discussed in our class introduction video, live Zoom sessions and recorded lectures are intended solely for enrolled students. This aligns with university privacy guidelines stating that any video, audio, or text content from class meetings — including interactions with other students — is considered private educational information.

When you watch the recorded lectures posted on Canvas, remember:

- These recordings **must not** be shared with individuals outside our course.
- Any portion of the recording that includes other students' contributions (spoken, written in chat, or visual) is protected under privacy rules and **cannot** be posted online or shared publicly.
- If you attend a live Zoom class, you should join from a private space, avoid sharing your screen with non-class members, and refrain from recording the session yourself unless you have prior instructor permission.

This ensures that the interactive aspects of our course remain a safe space for open academic discussion and comply with university policy and federal student privacy laws.

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 26th

Chapter 1: Biological Systems

Lecture 2, Sep 2nd

Chapter 2: Introduction to Mathematical Modeling

Lecture 3, Sep 9th

Chapter 3: Introduction to Mathematical Modeling and Static Network Models

Lecture 4, Sep 16th

Chapter 4: Discrete Biological systems

Lecture 5 Sep 23rd

Chapter 5: Continuous Biological Systems

Lecture 6, Sep 30th

Chapter 6: Optimal models

Lecture 7, Oct 7th

Midterm

Lecture 8, Oct 14h

Fall Break (Classes do not meet this week)

Lecture 9, Oct 21st

Chapter 9: Metabolic Systems

Lecture 10, Oct 28th

Chapter 10: Signaling Systems

Lecture 11, Nov 4th

Election Day No Classes

Lecture 12, Nov 11th

Chapter 13: System Biology in Medicine and drug development

Lecture 13, Nov 18th

Chapter 12: Physiological Modeling: The heart as an example/Fundamental of Calcium signaling

Chapter14: Population systems

Lecture 14, Nov 25th

Final Projects: presentation

Lecture 15, Dec 2nd

Final Projects: presentation

Lecture 16, December 10th

Reading week

Final Exam, December 16th @ 4:30 PM.

Changes if needed will be announced in the class.