

**FALL 2018 SYLLABUS
BF 701 - Systems Biology**

Instructor: Abigail S. Newsome

Office Location: Science and Technology Museum

E-mail Address: asnewsome@mvsu.edu

Class Meetings Location/Time:

MW/2:25pm – 3:40pm

Bioinformatics Computer Lab

Phone: 662-254-3395

Office Hours: 7am-1pm/M and 7am-11am/T

All email communication must include the words “BF701” in the subject line. I cannot guarantee an answer, or that I will even see any message that does not contain this information in the subject.

COURSE DESCRIPTION

Cells, tissues, organs and organisms are systems of components whose interactions have been defined, refined, and optimized over hundreds of millions of years of evolution. *Computational systems biology* is a field that aims at a system-level understanding of biological systems by analyzing biological data using computational techniques

REQUIRED TEXT

Primary literature, journal articles and Text – Roiger, Richard. 2017. Data Mining: A Tutorial Based Primer. CRC Press – Taylor & Francis Group. ISBN 978-1-4987-6397-4.

PREREQUISITES

BF611

PURPOSE

This course is designed to integrate the various fields of biology and natural science in order to better understand an entire cell works, how its processes are regulated and how a cell reacts to perturbations, anticipated and not anticipated. The steps toward the development of a systematic view of the biological processes studies accompanied by and based on a revolution of experimental techniques and methodologies.

GENERAL COURSE GOALS

The following general course goals are established to meet the purpose of BF603:

1. Gain an understanding computational tools needed for a wide range of genomics problems.
2. Gain an understanding of working in interdisciplinary teams of biologists, biochemists, medical researchers, geneticists, and computer engineers.
3. Gain an understanding of modeling cell systems

COURSE OBJECTIVES

The objective of this class is to prepare students for undertaking bioinformatics research that is biologically driven and develop their skills for critical evaluation of computational biology literature. The specific goals for students include

- To acquire a solid background in fundamental concepts of functional genomics and systems biology.
- To learn the state-of-the-art computational methods for biological data analysis.
- To develop a general understanding of the current state of the functional genomics field, and learn how to formulate and solve current biological questions with advanced computational methods.
- Develop skills for critical evaluation of computational biology literature.

COURSE CONTENT

This course will emphasize a data-driven approach to systems biology. This approach is in contrast to physics-driven methods that construct models of (small) biological networks and simulate them. The data-driven methodology, or at the least what we focus on in this course, tries to uncover and understand the large-scale structure of molecular interaction networks by analyzing and integrating massive amounts of different types of data. We will use a selection of papers from the literature to discuss these topics. Lectures by me, student presentations, and one or two invited lectures at the end of the semester will drive the course.

Major areas of study (tentative)

Major areas of study for BF701 will include:

- the analysis of DNA microarray data: basic clustering algorithms; computing -specific patterns of co-expression; identifying sets of co-regulated genes.
- experimental data-mining techniques for interactions
- interpreting and validating results
- model application.

EVALUATION AND GRADING PROCEDURES

Grading:

Exams (25%):

Two exams will be given, a midterm and a final exam.

Homework (25%):

Homework assignments will be given throughout the semester, each requiring the implementation of a computational method and its application to a real functional genomic dataset. These will be announced.

Class participation (5%):

To receive class participation credit, you must be present. Attendance will be taken each session.

Presentations (25%)

Each student will get to choose a topic to pursue as a 30 minute presentation.

Project/Poster Presentation (20%)

Grading Scale

90.5	—	100% = A
80.5	—	89% = B
70.5	—	79% = C
60.5	—	69% = D
Below		60.5% = F

Major areas of study for BF701 will include:

	Topic/Event	Homework (Due Date)
August 20	Introduction	
August 22	Chapter 1	
August 27	Chapter 1	
August 29	Chapter 1	
Sept 3	Chapter 2/Paper	
Sept 5	Chapter 2	

Sept 10	Chapter 3	
Sept 12	Chapter 3	
Sept 17	Chapter 4	
Sept 19	Chapter 4	
Sept 24	Chapter 5	
Sept 26	Chapter 5	
Oct 1	Chapter 6/Paper	
Oct 3	Chapter 6	
Oct 8	Chapter 7	
Oct 10	Chapter 7/Midterm	
Oct 15	Chapter 8	
Oct 17	Chapter 8	
Oct 22	Chapter 9/Paper	
Oct 24	Chapter 9	
Oct 29	Chapter 9	
Oct 31	Chapter 9	
Nov 5	Chapter 10	
Nov 7	Chapter 10	
Nov 12	Chapter 13	
Nov 14	Chapter 13	
Nov 19-Nov 23	Thanksgiving Break	
Nov 26	Chapter 13	
Nov 28	Chapter 13	
Dec 3-7	Final Exam	

Policies Regarding Attendance, Examinations, Grading and Supplies

Every student is expected to attend each lecture taking notes where applicable and recording observations. There will be no make-up lectures. If you should miss either a lecture due to illness or other circumstances, you must supply a written excuse from the dean of students. Attendance will be taken daily. Three unexcused absences in lecture will lower your final grade by ten points. You will receive a failing grade if you miss nine lectures without a written, approved excuse from the dean of students. This will be strictly enforced.

All students are responsible for reading all assigned materials prior to their discussion in class. Each student will be held responsible for completing all exercises. Classroom distractions are an annoyance to everyone and they interfere with the learning process. Chronic lateness, side conversations, unnecessary exits, cell phones or pagers are all considered unwanted distractions. Most Mississippi Valley State University students conform without reservation to the expected levels of classroom etiquette and I encourage students in this class to follow this

example.

Adherence to the University's code of academic honesty, as indicated in the undergraduate catalog, is expected. Please refer to the catalog for an explanation of this code and what is expected. It is your responsibility to be familiar with activities considered to constitute academic dishonesty that may comprise your own intellectual and moral development. Any instance of academic dishonesty - cheating and/or plagiarism - will be reported to the Office of Academic Affairs along with the materials associated with the act of academic dishonesty.

Services for Students with Disabilities (SSD) Disabilities Statement

Mississippi Valley State University is committed to providing reasonable accommodations for students with a documented disability. If you feel you are eligible to receive accommodations for a covered disability (medical, physical, psychiatric, learning, vision, hearing, etc.) and would like to request it for this course, you must be registered with the Services for Students with Disabilities (SSD) program administered by University College. It is recommended that you visit the Disabilities Office located inside the EMAP Computer Lab in the Technical Education (IT) Building to register for the program at the beginning of each semester. For more information or to schedule an appointment, please contact Mr. Billy Benson, Jr. via phone or email at 662-254-3005 or billy.benson@mvsu.edu.

Note

This syllabus is not a binding contract between the instructor and the student. It is intended to serve as a guide for the course. All deviations will be announced and submitted to students in writing.

Computer Lab

Please check the hours of operation of the computer lab. You are welcome to use the facility in a responsible manner at any unoccupied time between the hours of 8 AM and 5 PM on Monday - Friday. The lab is for Bioinformatics students only. Should you be found allowing others to accompany you in the use of the lab or be a visitor of yours in the lab, your usage privileges will be terminated.