

# CMSC702: Computational Systems Biology and Functional Genomics

This page and the [main course page](#) serve as syllabus for this class.

## Description

Major advances in technology for genomic studies are bringing the prospect of personalized and individualized medicine closer to reality. Many of these advances are predicated on the ability to generate data at an unprecedented rate, posing a significant need for computational data analysis that is clinically and biologically useful and robust.

This course will concentrate on the fundamental computational and statistical methods required to meet this need. It will cover topics in functional genomics, population genetics and epigenetics. Computational methods studied for this type of analysis include: supervised, unsupervised and semi-supervised learning, data visualization, statistical modeling and inference, probabilistic graphical models, sparse methods, and numerical optimization. Machine learning methods will be a core component of this class. No prior knowledge of biology is required.

## Course Information

- Instructor:  
[Héctor Corrada Bravo](#)  
Center for Bioinformatics and Computational Biology  
Department of Computer Science  
[hcorrada@umiacs.umd.edu](mailto:hcorrada@umiacs.umd.edu)  
Office: 3114F Biomolecular Sciences Building  
Phone Number: 301-405-2481
- Lecture Meeting times  
Tuesday and Thursday, 9:30pm-10:45pm  
Room CSI 3120
- Office Hours: Friday 1:00pm-2:00pm AVW 3223 and by appointment
- TA: Wikum Dinalankara  
[wikum@cs.umd.edu](mailto:wikum@cs.umd.edu)  
Office Hours: TBA
- Evaluation
  - Assignments: Three assignments including programming, data analysis and pen-and-paper problems (30%)
  - Project and its presentation (20%)
  - Paper presentation (15%) and discussion (10%)
  - Midterm (20%)
  - Class participation (5%)
- Textbook: There is no required textbook.

## Course Calendar

The course calendar including material to be covered is available in the [course homepage](#).

# Guidelines

## Teamwork

You will be working in teams of 2-4 students in this class, where each team will carry out three tasks: a) present a paper in class, b) lead discussion of a paper presented by another team in class, c) the final project.

You can find more information about each task below. Form teams using the [piazza class page](#). Teams need to be formed by the end of the second week of class. More information about team formation will be given in the first lecture.

## In-class Paper Presentations

Each team will present one paper during the semester. The (30 minute) presentation should center on methods and techniques, as the instructor will introduce required Biology concepts beforehand. For each presentation, another team will be assigned to lead discussion. This team should be prepared to ask questions, provide clarifications, and/or add perspective as required. More information about paper assignments will be given in the first lecture.

## Preliminary Project Guidelines

A substantial amount of the evaluation in this course (20%) will consist of a project. In general you can choose from four types of projects:

1. Algorithm/method design: Design and provide a preliminary implementation of an algorithm or method to analyze a particular type of genomic assay
2. Algorithm/method application: Apply existing algorithms or methods to existing genomic datasets
3. Literature review: Review the existing methods for a particular analysis task
4. Other: Any other *approved* project analyzing high-throughput genomic assays

More information about projects and possible project topics will be provided later in the semester.

## Policies

### Coursework policies

- There will be reading assignments. Students are expected to have read the material **before** class.
- Students are expected to attend lectures. Active participation is expected.
- Assignments are to be handed-in electronically or in class as instructed on their due date. Late assignments will be penalized.
- Students may discuss homeworks in groups. However, each student must write solutions independently.
- Programming exercises must be completed using R. We will spend time in class going over enough R that you can complete your assignments.

### Absence policies

Any student who needs to be excused for an absence from a single lecture, recitation, or lab due to a medically necessitated absence shall: a) Make a reasonable attempt to inform the instructor of his/her illness prior to the class. b) Upon returning to the class, present their instructor with a self-signed note attesting to the date of their illness. Each note must contain an acknowledgment by the student that the information provided is true and correct. Providing false information to University officials is prohibited under Part 9(i) of the Code of Student Conduct (V-1.00(B) University of Maryland Code of Student Conduct) and may result in disciplinary action.

The self-documentation may not be used for the Major Scheduled Grading Events as defined below and it may only be used for only 1 class meeting (or more, if you choose) during the semester. Any student who needs to be excused for a prolonged absence (2 or more consecutive class meetings), or for a Major Scheduled Grading Event, must provide written documentation of the illness from the Health Center or from an outside health care provider. This documentation must verify dates of treatment and indicate the timeframe that the student was unable to meet academic responsibilities. In addition, it

must contain the name and phone number of the medical service provider to be used if verification is needed. No diagnostic information will ever be requested. The Major Scheduled Grading Events for this course include: a) Paper presentation - per presentation schedule b) Project presentation - 5/6,5/8 or 5/13 per presentation schedule

### Other policies

- Cell phone usage is **prohibited** during lecture, laptop use will be allowed to the extent that students use it to follow along an in-class analysis or demonstration
- Using or referencing any materials from the web without proper citation is a violation to the honor code
- In this course you are responsible for both the [University's Code of Academic Integrity](#) and the [University of Maryland Guidelines for Acceptable Use of Computing Resources](#). Any evidence of unacceptable use of computer accounts or unauthorized cooperation on tests, quizzes, or projects will be submitted to the Student Honor Council, which could result in an XF for the course, suspension, or expulsion from the University.
- Any student eligible for and requesting reasonable academic accommodations due to a disability is requested to provide, to the instructor in office hours, a letter of accommodation from the Office of Disability Support Services (DSS) within the first TWO weeks of the semester.
- Any student who must miss a class due to religious holidays should also notify the instructor during the first two weeks of class. \*Course evaluations are important. The department and faculty take student feedback seriously. You can go to the [www.courseevalum.umd.edu](http://www.courseevalum.umd.edu) to complete evaluations.