JOHNS HOPKINS
WHITING SCHOOL
of ENGINEERING

Syllabus
Computer Science EN 600.649, Biology AS 600.649
Computational Genomics: Applied Comparative Genomics
Spring, 2017 (3 credits, EQ)

Instructors

- **Section 01:**
  Associate Professor Michael C. Schatz, mschatz@cs.jhu.edu,
  http://www.cs.jhu.edu/~mschatz/
  Office: Malone 323
  Office hours: Tuesday and Thursday, 3:00-4:00 pm; and by appointment

Meetings

- **Section 01:** Tuesday and Thursday, 1:30-2:45 pm in Shaffer 304.

Textbook

No textbooks are required but one is recommended

Online Resources

The following online resources are essential:

- The course web site location at https://github.com/schatzlab/appliedgenomics. You will find a schedule of topics, class notes, and assignment details there.
- The course Piazza site at https://piazza.com/jhu/spring2017/600649/home. This site will serve as our discussion site for the course. Please use Piazza to ask questions of the instructor and fellow students.

Course Information

- The primary goal of the course is for students to be grounded in theory and leave the course empowered to conduct independent genomic analyses. We will study the leading computational and quantitative approaches for comparing and analyzing genomes starting from raw sequencing data. The course will focus on human genomics and human medical applications, but the techniques will be broadly applicable across the tree of life. The topics will include genome assembly & comparative genomics, variant identification & analysis, gene expression & regulation, personal genome analysis, and cancer genomics. The grading will be based on assignments, a midterm exam, class presentations, and a significant class project. There are no formal course prerequisites, although the

course will require familiarity with UNIX scripting and/or programming to complete the assignments and course project.

Course Goals

Upon successful completion of this course, you should be able to:

1. Understand the theoretical foundations for several of the most important genomic analysis tools
2. Have hands-on experience running several of the most important genomic tools
3. Perform novel research and analysis in computational biology

Course Topics

We will study the leading computational and quantitative approaches for comparing and analyzing genomes starting from raw sequencing data. The course will focus on human genomics and human medical applications, but the techniques will be broadly applicable across the tree of life. The topics will include genome assembly & comparative genomics, variant identification & analysis, gene expression & regulation, personal genome analysis, and cancer genomics. Please see the main course website for a more detailed schedule, which will be updated as the semester progresses

Course Expectations & Grading

Course grades will be based on assignments (typically running and analyzing existing tools), an examination, and a class project, according to the proportions below. Each homework assignment will be assigned a point value; the overall homework assignment grade will be computed as your total points earned divided by the total achieved in the class.

- 30% - Assignments
- 30% - Midterm (April 6 within class)
- 40% - Class Project (Dec 18, 2016 at 9am – 12 noon)

All grades will be distributed via email. Please keep your own record of your grades so that you will know your standing in the course. Letter grades for the course will be assigned on a standard scale, subject to the instructor's evaluation of your overall class performance.

Assignment Logistics. The assignments and projects in this course will require you to execute command line programs and write code in the language of your choice. You must write all code independently unless the assignment specifically states that you can work in groups.

Attendance. All students are generally expected to attend all meetings of this course, and actively participate in all course meetings. If you miss a class meeting for any reason, you are responsible for material presented, and it is your responsibility to obtain any missed handouts or other materials.

Key Dates
Assignment and exam schedule will be distributed on the course webpage.

Assignments & Readings
Assignment and exam schedule will be distributed on the course webpage.

Ethics
The strength of the university depends on academic and personal integrity. In this course, you must be honest and truthful, abiding by the *Computer Science Academic Integrity Policy*:

> Cheating is wrong. Cheating hurts our community by undermining academic integrity, creating mistrust, and fostering unfair competition. The university will punish cheaters with failure on an assignment, failure in a course, permanent transcript notation, suspension, and/or expulsion. Offenses may be reported to medical, law or other professional or graduate schools when a cheater applies.
>
> Violations can include cheating on exams, plagiarism, reuse of assignments without permission, improper use of the Internet and electronic devices, unauthorized collaboration, alteration of graded assignments, forgery and falsification, lying, facilitating academic dishonesty, and unfair competition. Ignorance of these rules is not an excuse.
>
> Academic honesty is required in all work you submit to be graded. Except where the instructor specifies group work, you must solve all homework and programming assignments without the help of others. For example, you must not look at anyone else's solutions (including program code) to your homework problems. However, you may discuss assignment specifications (not solutions) with others to be sure you understand what is required by the assignment.
>
> *If* your instructor permits using fragments of source code from outside sources, such as your textbook or on-line resources, you must properly cite the source. Not citing it constitutes plagiarism. Similarly, your group projects must list everyone who participated.
>
> Falsifying program output or results is prohibited.
>
> Your instructor is free to override parts of this policy for particular assignments. To protect yourself: (1) Ask the instructor if you are not sure what is permissible. (2) Seek help from the instructor, TA or CAs, as you are always encouraged to do, rather than from other students. (3) Cite any questionable sources of help you may have received.
>
> On every exam, you will sign the following pledge: "I agree to complete this exam without unauthorized assistance from any person, materials or device. [Signed and dated]". Your course instructors will let you know where to find copies of old exams, if they are available.

In addition, the specific ethics guidelines for this course are:

1. In the completion of individual homework assignments, you may not discuss your approach with or show specifics of your code to others. This includes fellow students, former students, friends, etc. You are permitted to request assistance from course staff (instructors, TAs and CAs) only.
2. You are permitted and expected to reuse and adapt code from lectures and the assigned texts in completing your projects. However, all original sources must be cited in comments within your code.
3. In using Piazza to ask questions about homework assignments, you should post privately to Instructors any questions that involve code or that would give away your approach to solving the assignment. Otherwise, you are encouraged to ask general, abstract questions, and post them publicly, so other students may benefit from from the discussion.

Report any violations you witness to the instructor.

You can find more information about university misconduct policies on the web at these sites:

- For undergraduates: http://e-catalog.jhu.edu/undergrad-students/student-life-policies/
- For graduate students: http://e-catalog.jhu.edu/grad-students/graduate-specific-policies/

Students with Disabilities
Any student with a disability who may need accommodations in this class must obtain an accommodation letter from Student Disability Services, 385 Garland, (410) 516-4720, studentdisabilityservices@jhu.edu .