

**COSC 494/594 Special Topic: Bioinformatics Computing  
Fall 2020 Syllabus**

**Time and Location:** Tuesday & Thursday 1:10 pm-2:25 pm, Min Kao 425

**Instructor:**

- Dr. Scott Emrich
  - Office: 608 Min Kao; 974-3891; [semrich@utk.edu](mailto:semrich@utk.edu);
  - Tentative zoom office hours: Mon 2:00pm-3:00pm, after class, appointment
  - In a normal semester, if my office door is open, you are welcome to come in and ask questions. With covid-19 I may be working from home more than before so please email/post on Piazza before coming by to figure out the best way to meet.

**Course Webpage:** <http://web.eecs.utk.edu/~semrich/bc20/>

**Short Course Description:**

- Broad overview of bioinformatics with a substantial problem-solving component. Topics include: generative models for sequences, pairwise sequence alignment, basic methods in molecular phylogeny and evolution, *ab initio* gene prediction, whole genome comparisons, genome assembly and analysis.

**Course Outcomes:** At the end of the course, you will be able to answer, “What is bioinformatics?” and “What does computer science really have to offer biologists?” Specifically, you will be able to:

1. Define computational genomics and phylogenetics concepts. Assessed in exams.
2. Apply common bioinformatics tools and techniques effectively. Assessed in exams and assignments.
3. Implement basic algorithms such as sequence alignment. Assessed in exams and programming assignments.
4. Perform independent genome comparisons and assemblies using gained knowledge. Assessed in assignments.
5. Evaluate on your own the promise and challenges for computing on biological datasets. Assessed in the final project.

**Ideal prerequisites:**

CS340 for CS students, at least one semester of programming for non-EECS students.

**Textbook:** Cristianini and Hahn, *Introduction to Computational Genomics*.

Additional material will be made available as needed throughout the semester.

### Schedule of Major Topics and Exams:

1. DNA, genes and the genome (8/20)
2. Sequence statistics (8/25)
3. Sequence alignment (8/27-9/3)
4. Variation and natural selection (9/8)
5. Hidden Markov Models (9/10-9/24)
6. *Ab initio* gene finding (9/22)
7. Whole genome comparisons (9/29-10/1)
8. Midterm exam (10/6 *online*)
9. Genome assembly and validation (10/1-10/13)
10. Phylogenetic analysis (10/15-10/27)
11. Special topics (throughout)
12. Project presentations (12/24 *online*)
13. Final exam (TBD)

**Grading:** I will neither give an extension nor grade late work. You will have one of two alternatives. By default, the lowest homework grade greater than an 84% (B; see below) will be dropped before computing final grades. If the grade is below and/or by choice, students can alternatively submit one updated assignment for re-grading by 11/26. The revised grade will be used for final grading.

Final grades will be computed from a weighted sum of points as follows:

- 50%: homework (including programming and written answers submitted)
- 20%: final project
- 20%: midterm exam (Tuesday, October 6th)
- 10%: class participation

Course percentages will be translated into letter grades as follows: A: 94% and up; A-: 91-94%; B+: 88-91%; B: 84-88%; B-: 81-84%; C+: 78-81%; C: 74-78%; C-: 71-74%; D: 64-71%; F: 0-64%.

Absences will only be excused in accordance with University policy.

**Project:** A final project involving teams of students will be due at the end of the semester. Teams must consist of two to four students (solo projects won't be allowed).

**ADA statement:** If you need an accommodation based on a disability can contact Dr. Emrich privately. Full accommodation will be made once approved.

**Academic Code of Honor:** Any instance of academic dishonesty will not be tolerated. Because I want you to study and discuss course-related work with classmates, but will require you to submit independent assignments/programs, please refer to this document I co-wrote at ND for guidance: <http://cse.nd.edu/undergraduates/courses/honor-code>. I intend to use the "default" table listed this semester. In short, all graded work should go from your head to your fingers to submission; no copying of solutions (group or online).

## **SOCIAL DISTANCING & COVID-19 PROCEDURES (from Campus-wide Syllabus)**

“Students are required to wear face masks at all times and maintain social distancing (6 feet between individuals in traditional classrooms, or, in instructional laboratories and similar settings, only a few minutes in closer proximity when absolutely necessary to achieve learning objectives). Students who are feeling ill or experiencing symptoms such as sneezing, coughing, or a higher than normal temperature will be excused from class and should stay at home.

Instructors have the right to ask those who are not complying with these requirements to leave class in the interest of everyone's health and safety. In the event that a student refuses to comply with these requirements, the instructor has the right to cancel class.

Additionally, following other simple practices will promote good health in and out of the classroom, such as frequent and thorough hand washing, wiping down desks and seats with disinfectant wipes whenever possible, not sharing personal items such as pens and cell phones, and avoiding crowded hallways and other enclosed spaces.

The Volunteer Creed reminds us that we bear the torch in order to give light to others. As Volunteers, we commit to caring for one another and for the members of the communities in which we live, work, and learn. This semester, the University asks that we all demonstrate the Volunteer spirit by following these and other health guidelines and requirements.”