CSC 315-01, Genomic Data Analysis
Fall 2020
Eastern Connecticut State University

Instructor: Dr. Garrett Dancik
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(860) 465-4587
Science Building, Rm 257 (see Blackboard for virtual location)

Office Hours: MWF: 10-11:00
MW: 2-3:00, or by appointment

Course information:

Title:	Genomic Data Analysis
Day/Time:	MWF 11:00 – 11:50 AM (online – see Blackboard for login info)
Section:	01
Credit:	3 hours

Course Materials:

1. Software**:** R (http://www.r-project.org) and RStudio (http://www.rstudio.com)
2. Course notes and class website: https://gdancik.github.io
3. Additional course material: https://easternct.blackboard.com/
4. Piazza (https://piazza.com) will be used for online discussion. A mobile app is available from the App store (iPhone/iPad) or Google Play (Android devices)

Course Description

Bioinformatics is an interdisciplinary science that involves the development and use of computational and statistical tools to store and analyze large biological datasets such as genomic sequences and gene expression profiles. This course will cover core concepts in biology, statistics, and programming as related to the analysis of genomic data, with a focus on gene expression data. Students will gain proficiency in (1) programming in *R*, a statistical computing language, (2) statistical analyses using *R* and related theory, and (3) the analysis of gene expression data including data processing, identification of differentially expressed genes, clustering, and predictive modeling. The analysis of sequencing data will also be discussed.

Online discussion: We will use Piazza (https://piazza.com) as an online discussion and question and answer forum in this course. Shortly after the beginning of the semester, you will receive an e-mail with registration instructions sent to your Eastern e-mail address. Piazza allows for students to post and answer questions, anonymously if desired. The class benefits by seeing questions asked by other students (who often have the same questions as you) and by contributing answers. As the instructor, I will answer questions and can endorse correct student answers as well. For these reasons, all non-personal (e.g., not grade-related) questions should be posted to Piazza rather than e-mailed to me. Questions regarding homework assignments should be posted to Piazza. Questions about homeworks must be specific and may contain no more than *several* lines of code. Note that posts not meeting these criteria will be deleted and the poster penalized if warranted. Assignments where online discussion is required will be posted and/or announced in class.

Grading

Labs / Exercises	25%
Final Project	15%
Exam I	20%
Exam II	20%
Exam III	20%

Lab Policy: We will devote some class time to completion of lab assignments. These assignments will be due at the beginning of the class on the due date unless specified otherwise. *Late assignments will NOT be accepted* unless you have a valid reason (e.g., death in the family). Your lowest lab grade will be dropped. If you know ahead of time that you will be missing class or will not be able to complete an assignment on time, please talk to me and if appropriate, additional arrangements will be made.

Exam Policy: Make-up exams will only be given if you have a valid reason for missing the due date. If you know ahead of time that you will miss an exam, please talk to me before the exam to make arrangements for taking it. Missing **two** or **more** exams without official excuses will result in your dismissal from the course with a grade of **F**.

Grading Scale

93-100: **A**	90-92: **A-**	
87-89: **B+**	83-86: **B**	80-82: **B-**
77-79: **C+**	73-76: **C**	70-72: **C-**
6 5-69: **D+**	60-64: **D**	59 and below: **F**

Academic Honesty
You are encouraged to discuss projects and exercises with one another unless specified otherwise. However, copying answers from another student (unless otherwise specified) is *cheating* and this will not be tolerated. A student found cheating will automatically receive a grade of "F" on the assignment and will be reported to the department head with further potential consequences. In addition, students are responsible for familiarizing themselves with the University's numerous policies and procedures contained in the University Catalog and Student Handbook. The Code of Conduct policies and the Policy on Academic Misconduct are of special significance, since cheating, plagiarism, and personal misconduct are strictly prohibited and carry severe penalties. Students should read and understand Eastern's Academic Misconduct Policy, which can be found in the student handbook: *www.easternct.edu/academic-misconduct*. All violations will be handled under the procedures established in this policy.

Classroom civility
Unless the instructor indicates otherwise, online etiquette stipulates that you should keep your microphone muted and your video off unless you are speaking. This preserves bandwidth and limits distractions to others. You may unmute yourself to ask questions when invited to do so by the instructor; you can also "raise your hand" to get the instructor's attention if you have a question. In general, follow the Golden Rule and treat others with respect and the way you want to be treated.

Special Accommodations
Eastern Connecticut State University is committed to following the requirements of the Americans with Disabilities Act and Section 504 of the Rehabilitation Act. If you are a student with a disability (or think you may have a disability), and require adaptations or accommodations, or assistance evacuating a building in the case of an emergency, please contact the Office of AccessAbility Services (OAS) at 860-465-0189 to discuss your request further. Any student registered with the OAS should contact the instructor as soon as possible for assistance with classroom accommodations. Please note that accommodations are not retroactive, and must be communicated through a Letter of Accommodation which is drafted by the OAS.

***Tentative course schedule**

Week	Week of	Topic	
1	8/24/20	R Programming Fundamentals	
2	8/31/20	R Programming / Exploring Data with Graphs and Numerical Summaries	
3	9/7/20	***Labor Day – No Class Monday***	Exploring Data with Graphs and Numerical Summaries
4	9/14/20	Associations between Variables	
5	9/21/20	Advanced R Programming Concepts	**Review / Exam I**
6	9/28/20	Basic Concepts in Probability and Probability Distributions	
7	10/5/20	Normal Probability Distribution	
8	10/12/20	Statistical Inference	
9	10/19/20	**Review / Exam II**	
10	10/26/20	Gene Expression and Microarrays, Downloading and Normalization of Gene Expression Data	
11	11/2/20	Identification of Differentially Expressed Genes	
12	11/9/20	Heatmaps and Classification	
13	11/16/20	Classification Challenge	
14	11/23/20	Functional and Gene Set Enrichment Analysis	***Thanksgiving – No Class Wednesday or Friday***
15	11/30/20	Final Projects and Advanced Topics	
16	12/7/20	Review	***Last Day of Class (Monday)***
	12/11/20	**Exam III (11:00 – 1:00)**	

***This is a tentative schedule and is subject to change**