University of Florida
College of Public Health & Health Professions Syllabus
PHC 6937 Genetic Data Analysis (3 credit hours)
Semester: Spring 2018
Delivery Format: On-Campus
Course Website: Canvas at https://ufl.instructure.com

Instructor Name: Rhonda Bacher, Ph.D.
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Email Address: rbacher@ufl.edu
Lecture Hours: Tuesdays 11:45a-1:40p and Thursdays 12:50-1:40p
Office Hours: Tuesdays 2pm – 4pm (after class) or by appointment
Teaching Assistants: Chuan Zuo (zuochuan@ufl.edu)
Preferred Course Communications (e.g. email, office phone): rbacher@ufl.edu

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Prerequisites
The students should be at the level of a second year masters student in biostatistics or a closely related field, having a familiarity with linear algebra, basic statistics including maximum likelihood, simple hypothesis testing and linear regression.

PURPOSE AND OUTCOME

Course Overview
An introduction to statistical procedures in human genetics, Hardy - Weinberg equilibrium, basic linkage analysis, linkage disequilibrium, and association with disease. The goal is to prepare students for potential research in statistical genetics, but is also open to a wider community.

Relation to Program Outcomes
To introduce a variety of statistical methods commonly used in analyzing genetic data, with a focus on linkage analysis, disease mapping and association studies.

Course Objectives and/or Goals

Upon successfully completing this course, students should:

1. Understand basic population and quantitative genetic principles, including classical genetics, chromosomal theory of inheritance, and meiotic recombination
2. Perform QTL mapping of complex quantitative traits (linkage mapping). Understand differences between various mapping methods (single-marker, maximum likelihood, regression).
3. Use RNA-seq data to perform an eQTL analysis.
4. Understand methods for genome - wide association studies (association mapping), interpret results, and how to handle challenges in analysis.

DESCRIPTION OF COURSE CONTENT

Topical Outline and Tentative Course Schedule
Instructor reserves the right to modify the course schedule with advance notice provided to students.

Week	Date(s)	Topic(s)	Assignments
1	1/9, 1/11	Introduction to Genetics	
2	1/16, 1/18	Introduction to R, Genetic Data in R	Genetics Quiz
3	1/23, 1/25	Experimental Crosses, Heritability	
4	1/30, 2/1	Linkage, Recombination, EM Algorithm	
5	2/6, 2/8	Genetic Distance, Mapping	HW1 due
6	2/13, 2/15	QTL Mapping, LOD scores	
7	2/20, 2/22	QTL Mapping, Thresholds and Confidence Intervals	Project proposal due
8	2/27, 3/1	Advanced QTL Mapping	HW2 due
9	3/6, 3/8	--Spring Break--	
10	3/13, 3/15	RNA-seq	
11	3/20, 3/22	eQTL	HW3 due
12	3/27, 3/29	GWAS	
13	4/3, 4/5	GWAS	
14	4/10, 4/12	Multiple Testing, FDR	HW4 due
15	4/17, 4/19	Meta-analysis and integrative analyses	
16	4/24	Student Presentations	

Course Materials and Technology
There is no required text. Instead, handouts will be given out over the course of the semester.

The course materials will be available through the Canvas course website at https://ufl.instructure.com. It is imperative that students familiarize themselves with Canvas, check Canvas frequently for possible announcements, and make sure that their e-mail account in Canvas is correct and active.

For technical support for this class, please contact the UF Help Desk at:

- Learning-support@ufl.edu
- (352) 392-HELP - select option 2
- https://lss.at.ufl.edu/help.shtml

ACADEMIC REQUIREMENTS AND GRADING

Assignments

Students will be required to use their own computers in order to complete the assignments, and homework problems will require R programming. All homework must be typed (unless otherwise noted in class) and may be submitted either electronically or in class to the instructor and/or the teaching assistant of the class. Your responses must be supported by both textual explanations and the code you generate to produce your result.

Final project
The goal of the final project is complete a genetic data analysis from start to finish. Students should download publically available genetic data and re-analyze the data differently than the original authors (or subsequent publication) using methods described in class or newly published statistical methods. Students can either form groups of 2 themselves or work individually. A final report is required and should contain an introduction and description of the data, the biological question of interest, detailed descriptions of the analysis and statistics performed, and a discussion of the results. The final report should also include the R code used in

the analysis. Detailed instructions about the final project and paper will be described in class on Thursday Jan 18. A brief project proposal will be due on Thursday Feb. 22 and is part of the final project grade. In addition to the report, an in-class presentation (10-15 min) is scheduled for Tues April 24, although this may change depending on the size of the class. The final report is due on the day of the presentation.

Late Assignment policy:

Full credit will be given for assignments turned in on the due date (by 11:59pm). 80% credit for one day late. Assignments turned in the next school day after the due date will have a maximum possible credit of 80%. 50% credit for two days late. Assignment turned in two school days after the due date will have a maximum credit of 50%. NO credit given after two days late. If you are out sick, no deduction will be taken if you inform me before the homework is due that you are ill. Please stay home and do not get other people sick. Just turn in your homework as soon as you can. If you are going to miss school on the day the homework is due (going out of town, religious holiday, etc.) please turn your homework in early.

Grading

Requirement	Due date	Points or % of final grade (% must sum to 100%)
Quiz (Genetics)	January 18	10%
Homework 1	February 8	10%
Project Proposal	February 22	10%
Homework 2	March 1	10%
Homework 3	March 22	10%
Homework 4	April 12	10%
Project Presentations	April 24	20%
Project Paper	April 24	20%

Point system used (i.e., how do course points translate into letter grades).

Example:

Points earned	**93-100**	**90-92**	**87-89**	**83-86**	**80-82**	**77-79**	**73-76**	**70-72**	**67-69**	**63-66**	**60-62**	**Below 60**
Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E

You must include the letter grade to grade point conversion table below. Letter grade to grade point conversions are fixed by UF and cannot be changed.

Letter Grade	**A**	**A-**	**B+**	**B**	**B-**	**C+**	**C**	**C-**	**D+**	**D**	**D-**	**E**	**WF**	**I**	**NG**	**S-U**
Grade Points	4.0	3.67	3.33	3.0	2.67	2.33	2.0	1.67	1.33	1.0	0.67	0.0	0.0	0.0	0.0	0.0

For greater detail on the meaning of letter grades and university policies related to them, see the Registrar's Grade Policy regulations at:
http://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Policy Related to Make up Exams or Other Work

Any requests for make-ups due to technical issues MUST be accompanied by the ticket number received from LSS when the problem was reported to them. The ticket number will document the time and date of the problem. You MUST e-mail me within 24 hours of the technical difficulty if you wish to request a make-up.

Policy Related to Required Class Attendance

Please note all faculty are bound by the UF policy for excused absences. For information regarding the UF Attendance Policy see the Registrar website for additional details:
https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

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STUDENT EXPECTATIONS, ROLES, AND OPPORTUNITIES FOR INPUT

Expectations Regarding Course Behavior

Students are expected to spend an average of at least 2-1/2 hours per week per credit hour on the course exclusive of class time. This time includes but is not limited to reading, research, preparation for class, and course work.

Communication Guidelines

The preferred methods of communication for the course are messages in Canvas or e-mail.

Academic Integrity

Students are expected to act in accordance with the University of Florida policy on academic integrity. As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge:

"**We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity**."

You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied:

"On my honor, I have neither given nor received unauthorized aid in doing this assignment."

It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For additional information regarding Academic Integrity, please see Student Conduct and Honor Code or the Graduate Student Website for additional details:
https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/
http://gradschool.ufl.edu/students/introduction.html

Please remember cheating, lying, misrepresentation, or plagiarism in any form is unacceptable and inexcusable behavior.

Online Faculty Course Evaluation Process
Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at https://evaluations.ufl.edu. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results/.

SUPPORT SERVICES

Accommodations for Students with Disabilities
If you require classroom accommodation because of a disability, you must register with the Dean of Students Office http://www.dso.ufl.edu within the first week of class. The Dean of Students Office will provide documentation of accommodations to you, which you must then give to me as the instructor of the course to receive accommodations. Please make sure you provide this letter to me by the end of the second week of the course. The College is committed to providing reasonable accommodations to assist students in their coursework.

Counseling and Student Health
Students sometimes experience stress from academic expectations and/or personal and interpersonal issues that may interfere with their academic performance. If you find yourself facing issues that have the potential to or are already negatively affecting your coursework, you are encouraged to talk with an instructor and/or seek help through University resources available to you.

- The Counseling and Wellness Center 352-392-1575 offers a variety of support services such as psychological assessment and intervention and assistance for math and test anxiety. Visit their web site for more information: http://www.counseling.ufl.edu. On line and in person assistance is available.
- You Matter We Care website: http://www.umatter.ufl.edu/. If you are feeling overwhelmed or stressed, you can reach out for help through the You Matter We Care website, which is staffed by Dean of Students and Counseling Center personnel.
- The Student Health Care Center at Shands is a satellite clinic of the main Student Health Care Center located on Fletcher Drive on campus. Student Health at Shands offers a variety of clinical services. The clinic is located on the second floor of the Dental Tower in the Health Science Center. For more information, contact the clinic at 392-0627 or check out the web site at: https://shcc.ufl.edu/
- Crisis intervention is always available 24/7 from:
  Alachua County Crisis Center:
  (352) 264-6789
  http://www.alachuacounty.us/DEPTS/CSS/CRISISCENTER/Pages/CrisisCenter.aspx

Do not wait until you reach a crisis to come in and talk with us. We have helped many students through stressful situations impacting their academic performance. You are not alone so do not be afraid to ask for assistance.
