Statistics 6625 (Autumn 2016)
Statistical Analysis of Genetic Epidemiology Data

Instructor	Prof. Shili Lin, 440A Cockins Hall, 2-7404
Lectures	MWF 9:10-10:05am, Caldwell Lab 119. No classes on Sep 5, Oct 14, Nov 23, & 25.
Office Hours	MW 10:10-11:10 AM and by prior appointment
Website	http://carmen.osu.edu
Required Textbook	Zigler A and Konig IR (2010) *A statistical approach to genetic epidemiology: concepts and applications*, 2nd Edition. John Wiley & Sons.
Recommended Textbooks	Thomas D (2004) Statistical Methods in Genetic Epidemiology. Lin S and Zhao H (2010) Handbook on Analyzing Human Genetic Data: Computational Approaches and Software.
Course Description	Introduction to genetic epidemiology; molecular genetics and Mendelian principles; genetic markers and distances; model-based and model-free population and family based (genome wide) association studies; association analysis using haplotypes; analysis of DNA methylation data; other current topics.
Learning Objectives	Develop familiarity with problems addressed in genetic epidemiology; Learn statistical approaches used in solving such problems; Conduct data analysis using software
Homework & Project	There are approximately 6 homework assignments and 3 data analysis projects that require the use of computing software.
Exam 1	Wednesday, October 12 (in class). One 8.5" X 11" sheet of notes may be used for the exam. **No make-up exam will be given.**
Exam 2	Monday, November 21 (in class). One 8.5" X 11" sheet of notes may be used for the exam. **No make-up exam will be given.**
Final Project	In class presentation.
Grading	The final numerical grade will be determined as follows. Attendance may be taken into account if necessary.

Homework	20%
Projects	15%
Exam 1	20%
Exam 2	20%
Final Project	25%

Special Accommodations	If you need any accommodations based on the impact of a documented disability, contact the instructor privately to discuss your specific needs. You should also contact the Office of Disability Services to coordinate special accommodations.
Academic Misconduct	Academic misconduct will not be tolerated and will be dealt with procedurally in accordance with university policy.

Tentative Schedule

Week	Dates	Topics	Assigned Readings
1	Aug 24, 26	Molecular Genetics, Mendelian Principles, Genetic Traits, Hardy-Weinberg Equilibrium	Chapters 1 and 2
2	Aug 29, 31, Sep 2	HWE, Genetic Markers, Map Distances	Chapters 2, 3 and 5
3	Sep 7, 9	Linkage Disequilibrium	Chapter 10
4	Sep 12, 14, 16	Population-Based Association Analyses	Chapters 11
5	Sep 19, 21, 23	Pop. and Family-Based Association Analyses	Chapters 11 and 12
6	Sep 26, 28, 30	Family-Based Association Analyses	Chapter 12
7	Oct 3, 5, 7	Haplotype Analysis	Chapter 13
8	Oct 10	Genome-Wide Association Studies (GWAS)	Chapter 14
8	Oct 12	Midterm 1	
9	Oct 17, 19, 21	Pop-Based Assoc Analyses for Rare Variants	Research papers
10	Oct 24, 26, 28	Family-Based Assoc Analyses for Rare Variants	Research Papers
11	Oct 31, Nov 2, 4	DNA Methylation and EpigenomeWAS (EWAS)	Research Papers
12	Nov 7, 9, 11	Differentially Methylated Regions	Research Papers
13	Nov 14, 16, 18	Hi-C Data and Chromatin Interactions	Research Papers
14	Nov 21	Midterm 2	
15	Nov 28, 30, Dec 2	ChIA-PET and Long-Range Regulation	Research Papers
15	Nov 30, Dec 2	Presentations	
16	Dec 5, 7	Presentations	