Statistics 8625 (Autumn 2019)
Statistical Methods for Analyzing Genetic Data

Instructor	Prof. Shili Lin, 440K Cockins Hall, 2-7404, shili@stat.osu.edu
Lectures	TR 9:35 AM - 10:55 AM; McPherson Lab 1008. No classes on October 10, November 28
Office Hours	TR 11:00 AM - 12:00 PM
Grader	Mr. Chenggong Han; han.1071@osu.edu
Website	http://carmen.osu.edu
Prerequisite	Stat 6802 or equivalent, or permission of instructor
Course Requirements	You are responsible for: material covered in class, assigned readings, homework assignments, and project. Class attendance is required.
Topics	*Subject areas*: Population genetics Linkage analysis (sib-pairs and extended families) (Genome-wide) Association studies (GWAS; population and family; SNP and haplotype) Differential analysis (gene expression, DNA methylation, Epigenome-wide AS - EWAS) Chromatin 3D structure and spatial gene regulation (long-range interaction) Quantitative Trait Loci (QTL), mediation analysis, data integration, and genetic network Microbiome *Statistical methods*: Exact and Monte Carlo methods Likelihood-ratio test, score test, and non-parametric test Kernel-based methods Lasso, Bayesian Lasso, graphical Lasso, and other methods for sparse features Stochastic and hierarchical modeling
Homework	There are several homework assignments. They are based on the materials covered in lectures. No late homework will be accepted.
Assessments	There is one midterm exam; date TBA.
Project	The project is to read, summarize, and present a journal article. Novel ideas on extending statistical methodologies or improving computational algorithms will be awarded extra points. **A more research oriented project is also possible.**
Grades	The final numerical grade will be determined as follows:

Homework assignments	15%
Midterm exam	25%
Reading and participation in class discussion	10%
Project presentation	30%
Final report	20%

References	Research Papers (More classical topics) Lange K (2003) *Mathematical and statistical methods for genetic analysis*, 2^{nd} Ed

Academic Misconduct It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct http://studentlife.osu.edu/csc/.

Disability Services Students with disabilities (including mental health, chronic or temporary medical conditions) that have been certified by the Office of Student Life Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office of Student Life Disability Services is located in 098 Baker Hall, 113 W. 12th Avenue telephone 614- 292-3307, slds@osu.edu; slds.osu.edu.