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     You are responsible for: material covered in class, assigned readings, homework assignments, and project. Class attendance is required.
Requirements
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
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.