Title: Statistical Methods for Risk Prediction and Precision Medicine (0.5 unit)
Time: Spring 2022, 1/12-3/02, M/W 1:45pm-3:15pm
Instructor: Jinbo Chen, Ph.D.

Course Objective

This is an advanced elective course for graduate students in Biostatistics, Epidemiology, and other BGS disciplines. It covers various topics for developing and evaluating models for predicting risk of binary and time-to-disease outcomes, focusing on 1) study designs and statistical methods for model development; 2) statistical measures and inference methods for model evaluation; and 3) various topics related to application of machine learning algorithms. The instructor will give lectures as well as lead discussions on key statistics and medical literature.

Grading: Final grade will be determined as follows: 50% homework, 20% class participation, and 30% presentation. There will no in-class midterm or final exam.

Homework: There will be three sequential homework assignments. They will involve a combination of analytical problems, data analyses, and simulation studies. For problems involving programming, both the program and output should be turned in. Students are encouraged to work together on homework; but each student must turn in his/her own solutions.

Final Presentation: Each student is expected to work with the instructor to identify a research paper on risk prediction, preferably relevant to his/her own dissertation research or rotation projects. Each student is expected to prepare a 20 minute presentation summarizing the paper, and lead discussion on both theoretical and practical aspects.

Textbooks: There is no textbook for this course. We will use class notes and heavily rely on journal articles. Suggested readings: Kalbfleisch & Prentice. The Statistical Analysis of Failure Time Data, 2002; Pfeiffer & Gail. Absolute risk: methods and applications in clinical management and public health, 2017; Hastie, Tibshirani, and Friedman. The Elements of Statistical Learning: Data Mining, Inference and Prediction. 2009.

Scientific Rigor and Reproducibility: Through critical review of key literature and comprehensive data analysis of the course project, this course will provide practical training on statistical/machine learning methods for developing accurate risk prediction models.