ISyE 6404 – Nonparametric Statistics

1. Instructor: Dr. Jye-Chyi (JC) Lu
2. Class time and Location: 9:30 – 10:45 am, TR, ISyE Annex #228
3. Reference/Textbook: P. H. Kvam and B. Vidakovic, *Nonparametric Statistics with Applications to Science and Engineering* (ISBN: 978-0-470-08147-1)
4. Office Hours and Location: 13:25 – 14:50 pm TR at Groseclose #312
5. Email: jclu@isye.gatech.edu (I will be the main contact for this course)
6. Class web page: We will use GT's Canvas (ISyE 6404) for class materials
7. Teaching Assistant: TBA
8. Course prerequisites: Master-Level statistics and probability.
9. Course Topics: Rank-based Methods, ANOVA, Nonparametric Inference, Smoothing, and Nonparametric (and Semi-Parametric) Regression
10. Software Application Projects: Students will use software such as Matlab, R, Excel, Minitab, SAS, SAS - JMP, and other publically available statistical packages to conduct a few hands-on data analysis projects.
11. Detailed Topics: This is a Master-Level *methodology and application* course. The course will cover most nonparametric statistics popular in applications such as bio-medical studies and reliability engineering. Below are five parts in the course contents. Part I - Review: Probability and Distribution Theory, Ordered Statistics; Part II - Rank-based Methods: Goodness-of-Fit, Sign Test, Rank Test, ANOVA; Part III – Empirical Likelihood (NPMLE), K-M estimator, Density Estimation (DE); Part IV –Proportional Hazards Regression, Bootstrap and Jackknife; Part V – Nonparametric Regression: Cross-Validation, Kernel Regression, Local Polynomials, Penalized Regression, Regularization and Splines, Smoothing Using Orthogonal Functions, Wavelet-based Smoothing.
11. Grade Distribution:
    a) Part I & II - Review, Order-Statistics, Rank-based Methods, ANOVA (Exam #1 – 25%)
    b) Part III & IV – NPMLE, K-M Estimator, DE, PH-Regression (Exam #2 – 25%)
    c) Part V - Nonparametric Regression (Kernel and Spline), Cross-Validation, Bootstrap and Jackknife, Applications (Take-home Exam #3 – 18%).
    d) Enrichment Project (*two* Team Projects – EP-1 (15%), EP-2 (7%))
    e) Computing Project (individual project – CP-1 (7%))
    f) Attendance and Survey: 3% (6 attendance will be checked *randomly*; students are allowed up to 2 missing attendance). 1% will be allocated to instructional survey.