• COURSE INFORMATION:
  o ESI 4607, number, 001, **Engineering Analytics II**, 3 cr.

• LOGISTICS: Fall, T 6:20-9:05, ENB118, On-Site Lecture/Recitation

• INSTRUCTOR INFORMATION: Prof. Shuai Huang, Ph.D. Office: ENC 2509. Office Hour: Thursday 5:00 – 6:00, 813-974-2090. Contact information: shuaihuang@usf.edu, Industrial and Management Sciences Engineering, College of Engineering. [name of teaching assistant(s), contact information, office hours]: TBD

• COURSE DESCRIPTION: This is a 3 credit hour course offered to upper division undergraduate and graduate students. Students from other engineering disciplines may take this elective with advanced permission of the professor. Prerequisites include linear algebra, engineering statistics, basic optimization concepts such as KKT conditions, Newton method, etc. Students are expected to have programming skills in Matlab, R, SAS. If some prerequisites have not been taken yet, approval must be obtained for the course. Blackboard will be used to post course materials, provide course communications, submit homework and examinations.

• COURSE OBJECTIVES: This course is to prepare our students for the emerging new form of competition based on the extensive use of data and fact-based decision making, called Analytics, in many engineering and economic sectors. The following are the course objectives:

1. Ability to design and conduct experiments, as well as to analyze and interpret data
2. Ability to identify, formulate, and solve engineering problems
3. Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

• STUDENT LEARNING OUTCOMES:

  1) For Objective 1:

     a) Demonstrate understanding of the underlying mechanism that generates data using multiple regression and graphical models (exploration). Measured through HW and exams.

     b) Learn to visualize data to enhance conceptual understanding using residual plots and parallel coordinate plot (visualization). Measured through HW and exams.
2) For Objective 2:
   a) Learn to decompose a large-scale system into smaller sub-systems: ANOVA, multiple regression and LASSO (decomposition). Measured through HW and exams.
   b) Demonstrate knowledge of extracting relevant and significant entities in the system using principal component analysis and k-mean clustering (reduction). Measured through HW and exams.

3) For Objective 3:
   a) Learn to use predictive models on historic data using logistic regression and support vector machine (prediction). Measured through projects.

- READINGS: Textbook: Business Analytics for Managers (tentative) by Jank; Supplementary textbook: An introduction to data mining by Tan, Steinback, Kumar. Required software: R, MATLAB, SAS. R is free, MATLAB and SAS can be assessed in-campus.

- GRADING POLICY: Mid-term Exam: 30%; Final exam – 30%. Project – 40%.
- The following grading scale will be used

  97 to 100% A+  93 to 96% A  90 to 92% A-
  86 to 89% B+  83 to 85% B  80 to 82% B-
  76 to 79% C+  73 to 75% C  70 to 72% C-
  66 to 69% D+  63 to 65% D  60 to 62% D-
  Below 60% F

Grades will be posted on Blackboard; additional credit may be available on examinations but will be clearly stated on the exam. There is no other extra credit available.

- EVALUATION ITEMS:

  Project:
1) Student will be given a topic in statistical learning and a dataset. The student is responsible for understanding the topic and applying it to the dataset. To understand the topic, the student will need to conduct some literature search. Although the instructor will recommend some papers, the student should find and read more papers in order to understand the topic well.

2) Discussion: the student should arrange at least three individual meetings throughout the semester to discuss the topic with the instructor.

3) Deliverable: The student will write a manuscript ready to be submitted to a journal (20~30 pages, 12 font size, double line space) describing the method and the results of data analysis. The manuscript is due by EMAIL to shuaihuang@usf.edu by the LAST DAY of class.

Exams: provide summative evaluation of the material covered in the course.

Homework: will be assigned for each class session but will not be graded (except if not submitted)

- ATTENDANCE POLICY: Attendance at all class sessions is expected.

- COURSE OUTLINE/SCHEDULE: TBD

- UNIVERSITY POLICIES: See www.ugs.usf.edu/ugc/standard_policies.htm