EEL 6533   Data Analytics and Decision Sciences (2022)

1. **Catalog Description** In big data analysis, hypothesis testing of signals in the presence of noise and estimation of signal parameters are often encountered. We provide fundamentals on these topics to facilitate big data analysis. We will consider Bayes, Neyman-Pearson, minimax criteria for decisions. We will cover sequential detection and robust detection techniques. We will introduce maximum likelihood estimation of signal parameters and best performance bound analysis. 3 credits.

2. **Pre-requisites and Co-requisites** EEL 5544 or equivalent.

3. **Course Objectives** To gain fundamental knowledge in data analytics and decision sciences, focusing on the detection of signals and estimation of signal parameters.

4. **Contribution of course to meeting the professional component** N/A.

5. **Relationship of course to program outcomes**: N/A.

6. **Instructor** Professor Jian Li
   a. Office location: 465 EB
   b. Telephone: 392-2642
   c. E-mail address: li@dsp.ufl.edu
   d. Web site: www.sal.ufl.edu
   e. Office hours: By appointment only.

7. **Teaching Assistant** N/A.
   a. Office location
   b. Telephone
   c. E-mail address
   d. Office hours

8. **Meeting Times/Periods** Tue and Thu 5:10 pm – 7 pm.

9. **Class/laboratory schedule** No labs.

10. **Meeting Location** LAR239.

11. **Material and Supply Fees** N/A.

12. **Textbooks and Software Required**
    a. Title: An Introduction to Signal Detection and Estimation
    b. Author: H. Vincent Poor
    c. Publication date and edition: 1998, Second Edition
    d. ISBN number: 0-387-94173-8

13. **Recommended Reading**
    a. Title: Detection, Estimation, and Modulation Theory, Part I – Detection, Estimation, and Filtering Theory
    b. Author: Harry L. Van Trees and Kristine L. Bell
    c. Publication date and edition: 2013, Second Edition

14. **Course Outline** (provide topics covered by week or by class period)
    a. Review of probability and random processes, 2 periods
    b. Data analytics and hypothesis testing, 9 periods
    c. Decision sciences and signal detection, 9 periods
    d. Random parameter estimation and performance bound analysis, 8 periods
    e. Nonrandom parameter estimation and performance bound analysis, 8 periods
    f. Big data analysis applications, 4 periods

15. **Attendance and Expectations** Attendance required, cell phones must be turned off.

16. **Grading** Project (1): 100%.

    Homework assignments will be given for the course and will be discussed as needed.

17. **Grading Scale** Tentative: 90-100 A, 85-89 B+, 80-84 B, etc.

18. In order to graduate, graduate students must have an overall GPA and an upper-division GPA of 3.0 or better (B or better). Note: a B- average is equivalent to a GPA of 2.67, and therefore, it does not satisfy this graduation requirement. For more information on grades and grading policies, please visit:

    http://gradschool.ufl.edu/catalog/current-catalog/catalog-general-regulations.html#grades

19. **Make-up Exam Policy** N/A

20. **Honesty Policy** – All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a UF student and to be honest in all work submitted and exams taken in this course and all others.

21. **Accommodation for Students with Disabilities** – Students Requesting classroom accommodation must first register with the Dean of Students Office. That office will provide the student with documentation that he/she must provide to the course instructor when requesting accommodation.

22. **UF Counseling Services** – Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:
   - UF Counseling & Wellness Center, 3190 Radio Rd, 392-1575, psychological and psychiatric services.
   - Career Resource Center, Reitz Union, 392-1601, career and job search services.

23. **Software Use** – All faculty, staff and student of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.