EEL 6502     Adaptive Signal Processing

1. Catalog Description – (3 credits) Theory of adaptation with stationary signals; performance measures. LMS, RLS algorithms. Implementation issues and applications.

2. Pre-requisites - EEL 5701, EEL 5544

3. Course Objectives - The goal is to present the theory of adaptive signal processing and cover several engineering applications. The major topics will be the concept of adaptation, performance measures and the implementation of adaptive algorithms. Both the LMS and the RLS will be covered in detail. Adaptation of the signal bases will also be covered, such as eigendecompositions with on-line algorithms, and adaptation of generalized feedforward filters. Adaptive filtering in reproducing kernel Hilbert Spaces (RKHS).

4. Contribution of course to meeting the professional component (ABET only – undergraduate courses) – N/A

5. Relationship of course to program outcomes: Skills student will develop in this course (ABET only undergraduate courses) – N/A

6. Instructor – Dr. Jose Principe
   a. Office location: 451 NEB
   b. Telephone: 392-2662
   c. E-mail address: principe@cnel.ufl.edu
   d. Class Web site:
   e. Office hours:

7. Teaching Assistant - None
   a. Office location:
   b. Telephone:
   c. E-mail address:
   d. Office hours:

8. Meeting Times - Tu 2\textsuperscript{th}-3\textsuperscript{th}, Th 3\textsuperscript{rd}

9. Class/laboratory schedule, i.e., number of sessions each week and duration of each session - 3 class periods consisting of 50 minutes each

10. Meeting Location – 409 NEB

11. Material and Supply Fees - None

12. Textbooks and Software Required -
   a. Title: Adaptive Filter Theory
b. Author: Simon Haykin

c. Publication date and edition: Prentice-Hall, 2002

d. ISBN number: 013-090126-1

e. Software: MATLAB

13. Recommended Reading -
   a. Title: 
   b. Author: 
   c. Publication date and edition: 
   d. ISBN number: 

14. Course Outline –
   Adaptation as function approximation
   Filters as Function approximators
   Wiener Filter Theory
   Iterative algorithms
   Theory of adaptation: properties, search, measures
   Adaptive algorithms
   LMS
   RLS
   Frequency domain LMS
   Eigendecompositions
   Whitening transforms
   Adaptation in signal spaces: Generalized Feed forward Filters
   Lattice structures
   Adaptation in RKHS
   Theory
   KLMS
   KRLS

15. Attendance and Expectations - Cell phones are to be silenced. No text messaging during class or exams.

Requirements for class attendance and make-up exams, assignments, and other work are consistent with university policies that can be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

16. Grading –
   Homework 25%
   Project I 25%
   Project II 25%
   Exam 25%
17. Grading Scale (e.g., 90-100 A, 85-89 B+, 80-84 B, etc.) If grades are to be curved, so state. Values should not overlap and the full grade to percentage/points map must be included. –
   A: 93-100
   A-: 90-92
   B+: 87-89
   B: 83-86
   B-: 80-82
   C+: 77-79
   C: 73-76
   C-: 70-72
   D+: 67-69
   D: 63-66
   D-: 60-62
   E: 0-59

This statement must be included in every grade scale for undergraduate level 1000-4000 syllabi:
“A C- will not be a qualifying grade for critical tracking courses. In order to graduate, students must have an overall GPA and an upper-division GPA of 2.0 or better (C or better). Note: a C- average is equivalent to a GPA of 1.67, and therefore, it does not satisfy this graduation requirement. For more information on grades and grading policies, please visit: https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

This statement must be included in every grade scale for 5000 level graduate syllabi:

“Undergraduate students, in order to graduate, must have an overall GPA and an upper-division GPA of 2.0 or better (C or better). Note: a C- average is equivalent to a GPA of 1.67, and therefore, it does not satisfy this graduation requirement. Graduate students, in order to graduate, must have an overall 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: https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

This statement must be included in every grade scale for 6000 level graduate syllabi:

“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

18. Make-Up Exam Policy - If you have a University-approved excuse and arrange for it in advance, or in case of documented emergency, a make-up exam will be allowed
and arrangements can be made for making up missed work. University attendance policies can be found at:
https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

Otherwise, make-up exams will be considered only in extraordinary cases, and must be taken before the scheduled exam. The student must submit a written petition to the instructor two weeks prior to the scheduled exam and the instructor must approve the petition.

19. 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.

“…failure to comply with this commitment will result in disciplinary action compliant with the UF Student Honor Code Procedures (http://www.dso.ufl.edu/sccr/procedures/honorcode.php)

20. 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.

21. 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.

22. 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.