ECE 6202: Stochastic Signal Processing

Course Description
Spectrum estimation, array processing, and adaptive filtering.

Prior Course Number: ECE800, ECE801.01
Transcript Abbreviation: Stoch Sig Proc
Grading Plan: Letter Grade
Course Deliveries: Classroom
Course Levels: Graduate
Student Ranks: Masters, Doctoral
Course Offerings: Spring
Flex Scheduled Course: Never
Course Frequency: Odd Years
Course Length: 14 Week
Credits: 3.0
Repeatable: No
Time Distribution: 3.0 hr Lec
Expected out-of-class hours per week: 6.0
Graded Component: Lecture
Credit by Examination: No
Admission Condition: No
Off Campus: Never
Campus Locations: Columbus
Prerequisites and Co-requisites:
Exclusions: Not open to students with credit for 800 or 801.01.
Cross-Listings:

Course Rationale: Existing course.

The course is required for this unit's degrees, majors, and/or minors: No
The course is a GEC: No
The course is an elective (for this or other units) or is a service course for other units: Yes

Subject/CIP Code: 14.1001
Subsidy Level: Doctoral Course

Course Goals

Apply filtering techniques to the design and analysis of sensor arrays
Learn the foundations of adaptive filter theory: transient and steady-state behaviors of adaptive filtering algorithms
Develop facility with MATLAB as a tool for explanatory analysis and algorithm implementation in statistical signal processing
Apply vector space methods to stochastic signal processing problems
Learn fundamental bounds on estimation performance, with application to harmonic retrieval

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Review of random processes	3.0							
Classical methods for spectrum estimation	4.0							
Parametric techniques for spectrum estimation	5.0							

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Filtering and prediction	3.0							
Harmonic retrieval and fundamental bounds	4.0							
Array processing	5.0							
LMS transient and steady-state behavior	8.0							
LMS extensions, least-squares solutions and gemoetric interpretations	5.0							
Recursive least squares: transient and steady-state behavior	3.0							

Grades

Aspect	Percent
Homework and MATLAB based computer exercises	50%
One midterm exam	25%
Final exam	25%

Representative Textbooks and Other Course Materials

Title	Author
Statistical Digital Signal Processing and Modeling, John Wiley & Sons,. 1996	Monson H. Hayes
Course Notes	Phil Schniter

ABET-EAC Criterion 3 Outcomes

Course Contribution		College Outcome
***	a	An ability to apply knowledge of mathematics, science, and engineering.
**	b	An ability to design and conduct experiments, as well as to analyze and interpret data.
**	c	An ability to design a system, component, or process to meet desired needs.
	d	An ability to function on multi-disciplinary teams.
**	e	An ability to identify, formulate, and solve engineering problems.
	f	An understanding of professional and ethical responsibility.
*	g	An ability to communicate effectively.
	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
*	i	A recognition of the need for, and an ability to engage in life-long learning.
	j	A knowledge of contemporary issues.
***	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Additional Notes or Comments

`updated exclusion, goals, and topics to match university format`

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