Course Description

7054 - Detection and Estimation Theory

Course Code:	7054
Course Title	Detection and Estimation Theory
Academic Year:	2007
Semester:	1
Lecturer:	Dr. M. Sorell
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Content

Random processes. Functions of random variables, expectations, inequalities. Parameter estimation, convergence and performance bounds. Hypothesis Testing (including Neyman-Pearson, Bayesian and Mini-Max testing and locally optimum detection). Composite tests, sequential detection theory. Robust detection and performance bounds. M-ary detection. Continuous time detection.

Outcomes

After completion of this course, students will have an in-depth understanding of

- Optimal estimation of parameters of random processes
- Techniques for optimal hypothesis testing and applications in detection
- Robust detection techniques
- The application of bounds and inequalities to statistical systems

Mode of delivery

This course will be presented as a series of 12 three-hour interactive lectures (delivered in the style of a tutorial). Students will be expected to participate in class, including the preparation and presentation of some material.

Assumed knowledge

Undergraduate level signal processing, random processes and statistics.

Assessment

Assessment will be based on an end of semester examination (60%), homework (25%), mid-semester quiz (10%) and presentation of a journal paper to the class (5%). There will be 10 homeworks, each worth 2.5%. At least 6 homeworks must be submitted.

Course Reference:

Recommended textbook:

H. Vincent Poor, "An Introduction to Signal Detection and Estimation", Second Edition, Springer-Verlag, 1988. ISBN 0-387-94173-8.

Additional reference:

Henry Stark and John W Woods, "Probability, Random Processes and Estimation Theory for Engineers", Prentice-Hall, 1986 (First Edition) or 1994 (Second Edition). Various journal papers will be distributed. Some course notes will be provided electronically.

Graduate attributes

Graduate attributes and assessment

	Description	Homeworks (formative tasks)	Quiz and Exam (summative assessment)
GA1	An advanced level of knowledge and understanding of the theory and practice of Electrical and Electronic, Computer Systems or IT&T Engineering and the fundamentals of science and mathematics that underpin these disciplines.	all	Yes
GA2	A commitment to maintain an advanced level of knowledge throughout a lifetime of engineering practice and the skills to do so.	all	
GA3	The ability to apply knowledge in a systematic and creative fashion to the solution of practical problems.	all	Yes
GA5	Interpersonal and communication skills for effective interaction with colleagues and the wider community.	all; and paper presentation	
GA7	An ability to identify, formalise, model and analyse problems.	all	Yes
GA8	The capacity to design, optimise, implement, test and evaluate solutions.	all	Yes
GA10	Personal attributes including: perseverance in the face of difficulties; initiative in identifying problems or opportunities; resourcefulness in seeking solutions; and a capacity for critical thought.	all	Yes

These programs also foster the graduate attributes of the University of Adelaide and the Institution of Engineers Australia. These should be read in conjunction with the list above.