ELEN90079 Statistical Signal Processing

Credit Points:	12.5
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	2016, Parkville This subject commences in the following study period/s: Semester 2, Parkville - Taught on campus.
Time Commitment:	Contact Hours: 36 hours of lectures Total Time Commitment: 200 hours
Prerequisites:	None
Corequisites:	None
Recommended Background Knowledge:	Knowledge of probability and random models equivalent to: **Subject** | **Study Period Commencement:** | **Credit Points:** ELEN90054 Probability and Random Models | Semester 1 | 12.5 Knowledge of signals and systems concept, equivalent to: **Subject** | **Study Period Commencement:** | **Credit Points:** ELEN30012 Signals and Systems | Semester 2, Winter Term | 12.5 ELEN90058 Signal Processing | Semester 2 | 12.5
Non Allowed Subjects:	None
Core Participation Requirements:	For the purposes of considering request for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005), and Student Support and Engagement Policy, academic requirements for this subject are articulated in the Subject Overview, Learning Outcomes, Assessment and Generic Skills sections of this entry. It is University policy to take all reasonable steps to minimise the impact of disability upon academic study, and reasonable adjustments will be made to enhance a student's participation in the University's programs. Students who feel their disability may impact on meeting the requirements of this subject are encouraged to discuss this matter with a Faculty Student Adviser and Student Equity and Disability Support: http://services.unimelb.edu.au/disability
Coordinator:	Prof Erik Weyer
Contact:	Email: **ewey@unimelb.edu.au (mailto:ewey@unimelb.edu.au)**
Subject Overview:	The aim of this subject is to give students a rigorous introduction to the mathematical tools commonly employed in statistical signal processing. Topics include: State estimation algorithms (Kalman and Wiener filtering); parameter estimation algorithms (Least Squares, Maximum Likelihood, Maximum a Posteriori) and their adaptive versions. Other topics to be selected from: system identification, spectral analysis, nonlinear filtering; hidden Markov model signal processing; expectation maximization algorithm; distributed detection and estimation; information-theoretic aspects of estimation and detection (Cramer Rao bound, Divergence measures).
Learning Outcomes:	**Intended Learning Outcomes (ILOs)** On completion of this subject the student is expected to:

	1. Use the principle of orthogonality to derive least squares system identification and minimum mean square error state estimation algorithms 2. Use probability theory to analyze properties of system identification and filtering algorithms. 3. Formulate and solve optimal system identification and filtering problems.
Assessment:	Continuous assessment of assignments, not exceeding 60 pages in total over the semester, requiring approximately 25 hours of work in total. The continuous assessment consists of two projects to be submitted in Week 7 and Week 12 respectively (20%) Final 3 hour examination at end of semester (80%) Hurdle requirement:Students must pass the final exam in order to pass the subject. Intended Learning Outcomes (ILOs) 1-3 are assessed in the final written exam and through submitted homework assignments.
Prescribed Texts:	None
Breadth Options:	This subject is not available as a breadth subject.
Fees Information:	Subject EFTSL, Level, Discipline & Census Date, http://enrolment.unimelb.edu.au/fees
Generic Skills:	# Ability to apply knowledge of basic science and engineering fundamentals; # In-depth technical competence in at least one engineering discipline; # Ability to undertake problem identification, formulation and solution; # Ability to utilise a systems approach to design and operational performance; # Expectation of the need to undertake lifelong learning, capacity to do so; # Capacity for independent critical thought, rational inquiry and self-directed learning; # Intellectual curiosity and creativity, including understanding of the philosophical and methodological bases of research activity; # Openness to new ideas and unconventional critiques of received wisdom; # Profound respect for truth and intellectual integrity, and for the ethics of scholarship
Related Course(s):	Doctor of Philosophy - Engineering