MAST90052 Topics in Dynamical Systems

Credit Points:	12.50
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	2010, Parkville
	This subject commences in the following study period/s: March, Parkville - Taught on campus.
Time Commitment:	Contact Hours: 36 hours Total Time Commitment: 120 hours total time commitment.
Prerequisites:	A sound subject knowledge in real and complex analysis (equivalent to 620-221 Real and Complex Analysis).
Corequisites:	None.
Recommended Background Knowledge:	Measure and integral (materials equivalent to the content of 620-312 Linear Analysis) and partial differential equations (as covered in 620-331 Applied Partial Differential Equations).
Non Allowed Subjects:	None.
Core Participation Requirements:	For the purposes of considering requests for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005), and Students Experiencing Academic Disadvantage Policy, academic requirements for this subject are articulated in the Subject Description, Subject Objectives, Generic Skills and Assessment Requirements for this entry. The University is dedicated to provide support to those with special requirements. Further details on the disability support scheme can be found at the Disability Liaison Unit website: http://www.services.unimelb.edu.au/disability/
Coordinator:	Prof Omar Foda
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Subject Overview:	This is an introduction to mathematical topics in dynamical systems. Simple mechanical models will be used as concrete examples to introduce ideas and methods of interest in pure and applied mathematics as well as in mathematical physics. The Hamiltonian approach to dynamical systems will play a central role in the presentation. All necessary mathematical tools, including differential forms, symplectic manifolds, Lie groups and the co-adjoint orbit method, will be introduced.
Objectives:	On completing this subject, students will:
	 Understand the mathematical foundations of the theory of dynamical systems, Learn the fundamentals of the Hamiltonian approach to dynamical systems, Acquire facility in applying mathematical concepts to dynamical systems, and Acquire ability to pursue further studies in this and related areas.
Assessment:	Up to 50 pages of written assignments (40%: two assignments worth 20% each, due mid and late in semester), a 3 hour written examination (60%, in the examination period).
Prescribed Texts:	None.
Recommended Texts:	 # V.I. Arnold, Mathematical Methods of Classical Mechanics. 2nd edition. Springer, New York, 1997. # J.E. Marsden and T.S. Ratiu, Introduction to Mechanics and Symmetry: A Basic Exposition of Classical Mechanical Systems. 2nd edition. Springer, New Your, 2002.
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:	Upon completion of this subject, students should gain the following generic skills: # Problem-solving skills including the ability to engage with unfamiliar problems and identify relevant solution strategies

	 # Analytical skills through the ability to construct and express logical arguments and to working abstract or general terms to increase the clarity and efficiency of analysis # Through interactions with other students, the ability to work in a team # Time management skills: the ability to meet regular deadlines while balancing competing commitments.
Related Course(s):	Master of Science (Mathematics and Statistics)