PHYC90010 Statistical Mechanics

Credit Points:	12.50
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	2012, Parkville This subject commences in the following study period/s: Semester 1, Parkville - Taught on campus.
Time Commitment:	Contact Hours: TBA Total Time Commitment: TBA
Prerequisites:	A third year subject in statistical physics equivalent to

Subject	Study Period Commencement:	Credit Points:
PHYC30017 Statistical Physics	Semester 2	12.50

Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	None
Core Participation Requirements:	It is University policy to take all reasonable steps to minimise the impact of disability upon academic study and reasonable steps will be made to enhance a student's participation in the University's programs. This subject requires all students to actively and safely participate in laboratory activities. Students who feel their disability may impact upon their participation are encouraged to discuss this with the subject coordinator and the Disability Liaison Unit.
Coordinator:	Dr Nicole Bell
Contact:	Email: **msc@physics.unimelb.edu.au (mailto:n.bell@unimelb.edu.au)**
Subject Overview:	This subject provides an advanced introduction to the mathematical theory of collective phenomena in complex, many-body systems, in equilibrium and far from equilibrium, with an emphasis on critical phenomena and the emergence of long-range order. Specific topics may include phase transitions, transfer matrices, mean-field theory, Landau-Ginzburg theory, renormalization group, diffusive stochastic processes (Fokker-Planck equations), birth-death processes (master equations), kinetic transport, and spatio-temporal pattern formation in unstable nonlinear systems (bifurcations, chaos, reaction-diffusion equations). Examples are drawn from physics, chemistry, biology, and the social sciences.
Objectives:	The objectives of this subject are: # to challenge the students to expand their knowledge of fundamental physical principles; # to broaden their appreciation of how statistical mechanics integrates into the discipline of physics overall; # to develop their capacity to explain the emergence of long-range order in complex, many-bodysystems; # to appreciate the distinction between equilibrium and far-from-equilibrium dynamics in these systems; # to solve quantitative problems using the canonical mathematical techniques of statistical mechanics; # to provide the foundation for more advanced studies in statistical mechanics.
Assessment:	Four assignments totalling up to 48 pages of written work (40%), spaced equally during the semester, plus one 4-hour end-of-semester written examination (60%).

Prescribed Texts:	None
Recommended 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:	At the completion of this subject, students should have gained skills in: # analysing how to solve a problem by applying simple fundamental laws to more complicated situations; # applying abstract concepts to real-world situations; # solving relatively complicated problems using approximations; # participating as an effective member of a group in discussions and collaborative assignments; # managing time effectively in order to be prepared for group discussions and undertake the assignments and exam.
Notes:	Access to an internet-enabled computer may be useful for assignment completion.
Related Course(s):	Master of Science (Physics)
Related Majors/Minors/ Specialisations:	Physics