PHYC30017 Statistical Physics

Credit Points:	12.5
Level:	3 (Undergraduate)
Dates & Locations:	2015, Parkville This subject commences in the following study period/s: Semester 2, Parkville - Taught on campus.
Time Commitment:	Contact Hours: 2 to 4 hours per week, 36 in total, lectures and problem-solving classes Total Time Commitment: 170 hours total time commitment.
Prerequisites:	Physics Both of **Subject** / **Study Period Commencement:** / **Credit Points:** PHYC20010 Quantum Mechanics and Special Relativity — Semester 1 — 12.50 PHYC20009 Thermal and Classical Physics — Semester 1 — 12.50 **And Mathematics** **Subject** / **Study Period Commencement:** / **Credit Points:** MAST20009 Vector Calculus — Semester 1, Semester 2 — 12.50 And at least one of **Subject** / **Study Period Commencement:** / **Credit Points:** MAST10009 Accelerated Mathematics 2 — Semester 2 — 12.50 MAST20026 Real Analysis — Semester 1, Semester 2 — 12.50 MAST20030 Differential Equations — Semester 2 — 12.50
Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	Students may only gain credit for one of # PHYC30017 Statistical Physics
Core Participation Requirements:	For the purposes of considering request 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 of 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:	Assoc Prof Andy Martin
Contact:	**Email: PHYC30017@physics.unimelb.edu.au (mailto:PHYC30017@physics.unimelb.edu.au)**

Subject Overview:	Statistical mechanics, the microscopic basis of classical thermodynamics, is developed in this subject. It is one of the core areas of physics, finding wide application in solid state physics, astrophysics, plasma physics and cosmology. Using fundamental ideas from quantum physics, a systematic treatment of statistical mechanics is developed for systems in equilibrium. The content of this subject includes ensembles and the basic postulate; the statistical basis of the second and third laws of thermodynamics; canonical, micro-canonical and grand-canonical ensembles and associated statistical and thermodynamic functions; ideal quantum gases; black body radiation; the classical limit and an introduction to real gases and applications to solid state physics.
Learning Outcomes:	Students completing this subject should be able to: # explain the statistical basis of the second and third laws of thermodynamics and the application of statistical mechanics to a range of problems in physics; # calculate statistical and thermodynamic functions using the canonical, micro-canonical and grand-canonical ensembles; and # analyse and interpret mathematical expressions obtained in these calculations.
Assessment:	Two assignments each equivalent to 1500 words during the semester (10% each) and a 3-hour written examination in the examination period (80%).
Prescribed Texts:	D J Amit and Y Verbin, Statistical Physics: An Introductory Course, World Scientific
Recommended Texts:	K Huang, *Introduction to Statistical Physics*, Taylor and Francis
Breadth Options:	This subject potentially can be taken as a breadth subject component for the following courses: # **Bachelor of Arts (https://handbook.unimelb.edu.au/view/2015/B-ARTS)** # **Bachelor of Commerce (https://handbook.unimelb.edu.au/view/2015/B-COM)** # **Bachelor of Environments (https://handbook.unimelb.edu.au/view/2015/B-ENVS)** # **Bachelor of Music (https://handbook.unimelb.edu.au/view/2015/B-MUS)** You should visit **learn more about breadth subjects (http://breadth.unimelb.edu.au/breadth/info/index.html)** and read the breadth requirements for your degree, and should discuss your choice with your student adviser, before deciding on your subjects.
Fees Information:	Subject EFTSL, Level, Discipline & Census Date, http://enrolment.unimelb.edu.au/fees
Generic Skills:	A student who completes this subject should be able to: # analyse how to solve a problem by applying simple fundamental laws to more complicated situations. # apply abstract concepts to real-world situations. # solve relatively complicated problems using approximations. # participate as an effective member of a group in tutorial discussions # manage time effectively in order to be prepared for tutorial classes, undertake the written assignments and the examination.
Notes:	This subject is available for science credit to students enrolled in the BSc (both pre-2008 and new degrees), BASc or a combined BSc course.
Related Majors/Minors/ Specialisations:	Chemical Physics (specialisation of Physics major) Mathematical Physics Physics Physics Physics Physics Physics (specialisation of Physics major) Science-credited subjects - new generation B-SCI and B-ENG.