School of Physical and Chemical Sciences

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

General Course Information

PHYS310 and PHYS440 - 2026
Thermal, Statistical and Particle Physics

0.125 EFTS 15 Points
First Semester

Course Coordinator

Dr Chris Gordon (Particle Physics)
Room 617 von Haast Building Ph 369-5156
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Lecturers

Prof David Frame (Thermal Physics)
Room 724 von Haast Building
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Dr Konstantin Pavlov (Statistical Physics)
Room 726 von Haast Building
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Description
This course provides an introduction to the study of the physical properties of matter. It integrates the study of thermal properties of matter in bulk (thermodynamics) with the molecular/atomic approach (statistical physics). The particle physics is further extended to subatomic scales with an introduction to the phenomenology of nuclear structure, radiation processes and the standard model of particle interactions.

Assessment

- **There is NO FINAL EXAM for PHYS310/440**

The THREE sections of PHYS310/440 will be assessed independently in the form of 50-60 minute tests, homework and tutorial attendance with equal proportion between sections.

10% HW Assignments. These are pass/fail. Students must make a reasonable attempt at each question to earn 100% on that question. Feedback may be given on all attempted questions.
5% Tutorial attendance. A register will be taken at the beginning of each tutorial.
85% Three independent tests:

1. Thermodynamics Test: **Week 6**, **outside of lecture/tutorial times**
2. Statistical Mechanics Test: **Week 10, outside of lecture/tutorial times**
3. Nuclear and Particle Physics Test: **Semester 1 Examination Period**

❖ PHYS440 students will have extra assessment questions.

If you are **absent** from the test or exam, or if you consider that your performance in the test or exam was impaired, then you can apply for ***Special Consideration***. Action MUST be taken within 5 days of the assessment.

The link with details can be found at
http://www.canterbury.ac.nz/exams/special-consideration.shtml

Textbook

Your textbook from PHYS200, Serway, R A; Moses, C J; Moyer, C A. Modern physics. 3rd ed. will be a very good reference for many of the topics in PHYS310. However, you should not limit yourself to the discussion from just one author. Some other books that may be useful are:

Thermal and Statistical Mechanics

Thermal Physics (1980)	Kittel
Thermal Physics (1991)	Sprackling
Thermal physics: an introduction to thermodynamics, statistical mechanics, and kinetic theory (1988)	Riedi, P. C
Thermodynamics: principles and applications (1971)	Andrews, Frank C
Introductory Statistical Mechanics (1996)	Bowley and Sanchez
An Introduction to Statistical Thermodynamics (1995)	Gasser
Thermodynamics and Statistical Mechanics	Greiner et al
Thermodynamics, kinetic theory, and statistical thermodynamics: (1975)	Sears and Salinger.

Particle Physics

Introductory Nuclear Physics (1987)	Krane
Modern Physics for Scientists and Engineers (2020)	Thornton and Rex
Nuclear and Particle Physics (1991)	Williams
Particle physics (1997)	Martin and Shaw
Nuclear and particle physics (1975)	Frauenfelder, Hans,
Nuclear and particle physics source book (1988).	Parker
Nuclear and radiochemistry : fundamentals and applications (1997)	Karl Heinrich Lieser.

Notes
Some course material will be available on the Learn system: http://learn.canterbury.ac.nz/

Class Representative

- ❖ As part of the feedback system on the course a Class Representative will be appointed. This person (or persons) will be a volunteer selected during the first few lectures.
- ❖ The Class Rep acts as an intermediary between the class as a whole and our department so that any problems of an organizational type, level of difficulty, etc. nature can be brought to our attention. ❖ The Class Rep(s) will be members of the Departments Staff-Student Liaison Committee. This committee meets twice during the semester (refreshments supplied) where the reps report on their class and have an opportunity meet other reps and lecturers.

Contact Details

❖ If you have a problem with any part of the course there are several people who are available for advice.

- If the problem is with your understanding of the lecture or homework material then you should approach the Lecturer.
- The Class Representative who acts as a feedback channel from the class to the Department.

- If you have a grievance with some aspect of the course then in the first instance you should discuss the problem with the Lecturer. Failing a satisfactory resolution at this stage your next academic contacts are:
  - 300 level supervisor, Prof. Jenni Adams
  - Head of the School, Prof. Roger Reeves

Further steps involve the University grievance procedures. The UCSA is able to help here.

GENERAL INFORMATION

The School has general policies that apply to all courses regarding such matters as Dishonest Practice, Allowed types of calculators, Marks and Grades boundaries, Late Work, Academic Liaison, Assistance for Students with Disabilities, Reconsideration of Grades, Special Consideration Applications, etc. This information is available on the *Physics & Astronomy Undergraduate Courses* section of the Learn site.

PHYS310 2026			Monday	Thursday	Friday
	Monday	Lecture	9AM	3PM	11AM
Terms 1 & 2	Date	Week	Psychology - Sociology 252	F3	Rehua 528
	16-Feb	1	ThermoLec	ThermoLec	ThermoTut
	23-Feb	2	ThermoLec	ThermoLec	ThermoTut
	2-Mar	3	ThermoLec	ThermoLec	ThermoTut
	9-Mar	4	ThermoLec	ThermoLec	ThermoTut
	16-Mar	5	StatMechLec	StatMechLec	SMTut
ThermoTest	23-Mar	6	StatMechLec	StatMechLec	SMTut
	30-Mar				
	6-Apr				
	13-Apr				
	20-Apr	7	StatMechLec	StatMechLec	SMTut
	27-Apr	8	StatMechLec	StatMechLec	SMTut
	4-May	9	NucLec	NucLec	NucTut
SM test	11-May	10	NucLec	NucLec	NucTut
	18-May	11	NucLec	NucLec	NucTut
	25-May	12	NucLec	NucLec	NucTut