



The University of Southern Queensland

## Course specification

### Description: Atomic Physics

Subject	Cat-nbr	Class	Term	Mode	Units	Campus
PHY	2203	44326	2, 2005	ONC	1.00	Toowoomba

<b>Academic group:</b>	FOSCI
<b>Academic org:</b>	FOS002
<b>Student contribution band:</b>	2
<b>ASCED code:</b>	010301

### STAFFING

Examiner: Alfio Parisi  
Moderator: Brad Carter

### REQUISITES

Pre-requisite: (MAT1100 or MAT1102) and (PHY1103 or PHY1104)

### RATIONALE

The course provides background knowledge of major discoveries relating to the atom and the nucleus of the atom with the aim of providing the student with an understanding of the basic building blocks of matter. This course is of interest to students studying climatology, physics, mathematics, engineering and science education.

### SYNOPSIS

This course discusses topics necessary for the student to gain an understanding of the fundamental building blocks of matter. The concepts studied are related to the structure and properties of both the atom and the nucleus. A range of current applications are discussed in order to clarify and support the theories. A series of compulsory practical exercises are undertaken to demonstrate the principles involved.

### OBJECTIVES

On completion of the course students will be able to:

1. demonstrate an understanding of current theories on the fundamental building blocks of matter;
2. display knowledge on the applications of the theories;
3. demonstrate skills and knowledge required to perform laboratory experiments safely with appropriate equipment.

## TOPICS

	Description	Weighting (%)
1.	Special Relativity - speed of light; Einstein's postulates; Lorentz transformation; Time dilation, Length contraction; Relativistic momentum and energy.	20.00
2.	Nuclear Physics - Radioactivity; Radiation detectors; Nuclear reactions and processes; Nuclear fission and fusion; Radiation damage in matter; Particle accelerators; Fundamental particles.	40.00
3.	Atomic Physics - Atoms, ions and electrons; Nuclear Models; Atomic structure; Molecular structure; Properties of electromagnetic radiation; X-rays; Hydrogen atom; Pauli exclusion; Selection rules; Waves and particles.	40.00

## TEXT and MATERIALS required to be PURCHASED or ACCESSED

ALL textbooks and materials are available for purchase from USQ BOOKSHOP (unless otherwise stated). Orders may be placed via secure internet, free fax 1800642453, phone 07 46312742 (within Australia), or mail. Overseas students should fax +61 7 46311743, or phone +61 7 46312742. For costs, further details, and internet ordering, use the 'Textbook Search' facility at <http://bookshop.usq.edu.au> click 'Semester', then enter your 'Course Code' (no spaces).

Parisi, A 2005, *Laboratory Manual for Atomic Physics*, USQ Publication,

Serway, R A, Moses, C J & Moyer, C A 2005, *Modern Physics*, 3rd edn, Thomson, Belmont, USA.

## REFERENCE MATERIALS

Reference materials are materials that, if accessed by students, may improve their knowledge and understanding of the material in the course and enrich their learning experience.

Reviews of Modern Physics 539 P2

Fishbane, P M, Gasiorowicz, S & Thornton, S T 1996, *Physics for Scientists and Engineers*, 2nd edn, Prentice Hall, Upper Saddle River.

Serway, R A & Faughn, J S 2003, *College Physics*, 6th edn, Thomson, Pacific Grove, USA.

## STUDENT WORKLOAD REQUIREMENTS

ACTIVITY	HOURS
Examinations	3.00
Laboratory or Practical Classes	20.00
Lectures	24.00
Private Study	85.00
Report Writing	30.00
Tutorials	8.00

## ASSESSMENT DETAILS

Description	Marks out of	Wtg(%)	Due date
ASSIGNMENT	10.00	10.00	19 Jul 2005
CONTINUOUS LAB REPTS	30.00	30.00	19 Jul 2005 (see note 1)
3 HR RESTRICTED EXAM	60.00	60.00	END S2 (see note 2)

### NOTES

1. Lecturer will advise due dates of reports early in Semester
2. Examination dates will be available during the Semester. Please refer to the examination timetable when published.

## IMPORTANT ASSESSMENT INFORMATION

- 1 Attendance requirements:  
It is the students' responsibility to attend and participate appropriately in all activities (such as lectures, tutorials, laboratories and practical work) scheduled for them, and to study all material provided to them or required to be accessed by them to maximise their chance of meeting the objectives of the course and to be informed of course-related activities and administration.
- 2 Requirements for students to complete each assessment item satisfactorily:  
To complete the practical component satisfactorily, students must submit at least 8 of the nominated 10 practical reports and obtain at least 50% of the marks available for each report submitted. To complete the assignment satisfactorily, students must obtain at least 50% of the marks available for the assignment. To complete the examination satisfactorily, students must obtain at least 50% of the marks available for the examination.
- 3 Penalties for late submission of required work:  
If students submit assignments after the due date without prior approval then a penalty of 20% of the total marks gained by the student for the assignment will apply for each working day late.
- 4 Requirements for student to be awarded a passing grade in the course:  
To be assured of receiving a passing grade a student must submit all of the summative assessment items, achieve at least 50% in the examination, achieve an aggregated mark

of at least 50% in the total marks allocated for the assignments and at least 50% of the available weighted marks for the summative assessment items.

- 5 Method used to combine assessment results to attain final grade:  
The final grades for students will be assigned on the basis of the weighted aggregate of the marks obtained for each of the summative assessment items in the course.
- 6 Examination information:  
In a Restricted Examination, candidates are allowed access to specific materials during the examination. The only materials that candidates may use in the restricted examination for this course are: writing materials (non-electronic and free from material which could give the student an unfair advantage in the examination); calculators which cannot hold textual information (students must indicate on their examination paper the make and model of any calculator(s) they use during the examination. With the Examiner's approval, candidates may, take an appropriate non- electronic translation dictionary (but not technical dictionaries) into the examination. This will be subject to perusal and, if it is found to contain annotations or markings that could give the candidate an unfair advantage, it may be removed from the candidate's possession until the appropriate disciplinary action is completed.
- 7 Examination period when Deferred/Supplementary examinations will be held:  
Any Deferred or Supplementary examinations for this course will be held during the examination period at the end of the semester of the next offering of this course.
- 8 University Regulations:  
Students should read USQ Regulations 5.1 Definitions, 5.6. Assessment, and 5.10 Academic Misconduct for further information and to avoid actions which might contravene University Regulations. These regulations can be found at the URL <http://www.usq.edu.au/corporateservices/calendar/part5.htm> or in the current USQ Handbook.

## **ASSESSMENT NOTES**

- 9 In order to attend laboratory classes, students must provide and wear appropriate personal protective equipment. This shall include closed in shoes. Such equipment must be approved by supervising staff. Failure to provide and wear the appropriate safety equipment will result in students being excluded from classes.
- 10 The due date for an assignment is the date by which a student must despatch the assignment to the USQ. The onus is on the student to provide proof of the despatch date, if requested by the Examiner. Students must retain a copy of each item submitted for assessment. If requested by the Examiner, students will be required to provide a copy of assignments submitted for assessment purposes. Such copies should be despatched to USQ within 24 hours of receipt of a request being made. The examiner of a course may grant an extension of the due date of an assignment in extenuating circumstances.