



The University of Southern Queensland

## Course Specification

### Description: Atomic Physics

Subject	Cat-Nbr	Class	Term	Mode	Units	Campus
PHY	2203	14407	2, 2002	ONC	1.00	TWMBA

<b>Academic Group:</b>	FOSCI
<b>Academic Org:</b>	FOS002
<b>HECS Band:</b>	2
<b>ASCED Code:</b>	010301

### STAFFING

Examiner: Alfio Parisi  
Moderator: Jeff Sabburg

### PRE-REQUISITES

Pre-requisite: PHY 1103 or PHY 1911 and MAT 1102 or MAT 1100

### 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.

### 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:

- demonstrate an understanding of current theories on the fundamental building blocks of matter;
- display knowledge on the applications of the theories;
- 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:**

Books can be ordered by fax or telephone. For costs and further details use the 'Book Search' facility at <http://bookshop.usq.edu.au> by entering the author or title of the text.

PARISI, A. 2002, *Laboratory Manual for Atomic Physics*, USQ Publication,

Serway, R.A., Moses, C.J. & Moyer, C.A. 1997, *Modern Physics*, 2nd edition, Saunders College Publishing, Philadelphia.

### **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 edition, Prentice Hall, Upper Saddle River.

Serway, R.A. & Faughn, J.S. 2000, *College Physics*, 5th edition, Saunders College Publishing, Forth Worth.

## STUDENT WORKLOAD REQUIREMENTS

ACTIVITY	HOURS
Examinations	3
Laboratory or Practical Classes	20
Lectures	26
Private Study	72
Report Writing	36
Tutorial	13

## ASSESSMENT DETAILS

Description	Marks Out of	Wtg(%)	Required	Due Date
ASSIGNMENT	100.00	10.00	Y	11 Oct 2002
CONTINUOUS LAB REPORTS	100.00	30.00	Y	22 Jul 2002 (see note 2)
3 HR RESTRICTED EXAM	100.00	60.00	Y	END S2 (see note 3)

### NOTES:

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

## OTHER REQUIREMENTS

- 1 Attendance Requirements It is the students' responsibility to participate actively in all classes 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. Students must attend at least 80% of the practical classes in this course to be able to satisfy the practical requirements of Objective 4.
- 2 Requirements to Complete Satisfactorily Each Assessment Item To complete satisfactorily each of the assignments students must obtain at least half of the marks available for each assignment. To complete satisfactorily the practical component of the course, students must submit all nominated practical reports and obtain at least half of the marks available for each report submitted. To complete satisfactorily the examination of the course, students must obtain at least half of the marks available for the examination.
- 3 Minimum Requirements to Pass the Course To be assured of a pass in this course, students must: obtain an overall mark of at least 50%: and obtain at least 50% of the marks available in the examination; and obtain an overall mark of at least 50% in the other assessments.

- 4 Grading Final grades for students will be determined by the addition of the marks obtained in each assessment item, weighted as in the Assessment Details.
- 5 Supplementary and Deferred Examinations Students who obtain an overall passing mark, but who do not perform satisfactorily in an examination, may, at the discretion of the examiner, be granted a supplementary examination. Students will be granted a deferred examination only if they perform satisfactorily in all other assessment items. Any supplementary or deferred examination for this course will be held during the examination period at the end of the semester of the next offering of this course.
- 6 Assignments The due date for an assignment is the date by which a student must despatch it to the assignment to the USQ. The onus 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. This must be produced within 48 hours if required by the Examiner. In accordance with the University's Policy on Assignments (Regulation 5.6.1), the Examiner of a course may grant an extension of the due date of an assignment in extenuating circumstances. This policy may be found in the USQ Handbook, the Distance Education Student Guide and the Faculty of Sciences' Orientation Handbook for new on-campus students. All students are advised to study and follow the guidelines associated with this policy. All laboratory reports are due at the beginning of the next practical session to which the student has been assigned. A 10% penalty will apply up to 5pm of the due date. An assignment submitted after the due date without an extension approved by the Examiner, will attract a penalty of 20% of the assigned mark for each day (or part thereof) that the assignment is late.
- 7 Examinations Candidates should be aware that the University has policies and regulations (Regulation 5.6.2.2) about the use of unfair means and electronic devices in an examination and they should refer to them to determine whether or not actions they intend to take are acceptable to the University. Restricted Examination: Candidates will be allowed access only specific materials in a restricted examination. The only materials that candidates may use in the restricted examination for this course are: Writing materials (non-electronic and free from materials 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 approval of the Examiner, candidates may take an appropriate non-electronic translation dictionary into the examination. This will be subject to perusal and may be removed from the candidate's possession until appropriate disciplinary action is completed if found to contain material that could give the candidate an unfair advantage. A list of the materials candidates may access in the restricted examination will be on the frontispiece of the examination paper.
-