



The University of Southern Queensland

## Course specification

The current and official versions of the course specifications are available on the web at  
<<http://www.usq.edu.au/coursespecification/current>>.  
Please consult the web for updates that may occur during the year.

### Description: Spectroscopic Methods

Subject	Cat-nbr	Class	Term	Mode	Units	Campus
CHE	2201	74202	1, 2008	ONC	1.00	Toowoomba

<b>Academic group:</b>	FOSCI
<b>Academic org:</b>	FOS002
<b>Student contribution band:</b>	2
<b>ASCED code:</b>	010599

### STAFFING

Examiner: Grant Daggard  
Moderator: Robert Learmonth

### REQUISITES

Pre-requisite: CHE2120

### RATIONALE

This course is designed to provide a basic knowledge and understanding of topics relating to the interpretation of molecular spectra allowing the structural elucidation of organic compounds and is relevant to students pursuing degrees in Science.

### SYNOPSIS

THIS COURSE IS OFFERED IN EVEN-NUMBERED YEARS ONLY. Topics covered in this course are the application of a range of spectroscopic techniques, including; mass, ultraviolet, fluorescence, infra-red, and nuclear magnetic resonance spectroscopy, for the identification of organic substances. This course involves compulsory laboratory work and computer based exercises. This course may involve a field trip/excursion.

### OBJECTIVES

On completion of this course students will be able to:

1. analyse ultraviolet, fluorescence, infra-red, nuclear magnetic resonance and mass spectra of organic compounds (all assessment items);
2. identify and elucidate the structure of an organic compound from its spectroscopic properties (all assessment items);
3. prepare samples for and produce satisfactory spectra from IR, UV/Vis, and fluorescence spectrometers. Solve analytical and spectroscopic problems associated with the laboratory classes and computer based exercises (practical work).

## TOPICS

	Description	Weighting (%)
1.	Mass spectrometry: isotopic abundance; fragmentation.	5.00
2.	Infra-red Spectroscopy: analysis of IR spectra and characteristic group frequencies; sample preparation and instrument operation.	5.00
3.	Ultra-violet Spectroscopy: analysis of UV/Vis spectra and quantitative measurement; sample preparation and instrument operation.	5.00
4.	Nuclear Magnetic Resonance Spectroscopy: interpretation of proton NMR spectra; chemical shift and coupling constants; interpretation of carbon NMR spectra; interpretation of 2D NMR spectra.	15.00
5.	Spectroscopic identification of Organic compounds: how to use the synergistic information afforded from the combination of mass, UV, IR and NMR spectra to identify the structure of an organic molecule.	45.00
6.	Fluorescence Spectroscopy: analysis of fluorescence spectra and quantitative measurement; sample preparation and instrument operation.	5.00
7.	Laboratory and computer based exercises.	20.00

## 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).

Field, L D, Sternhell, S and Kalman, J R 2002, *Organic Structures from Spectra*, 3rd edn, John Wiley, Chichester.

## 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.

Lakowicz JR 1999, *Principles of Fluorescence Spectroscopy*, 2nd edn, Kluwer Academic/Plenum Publishers, New York.

(ISBN 0-306-46093-9)

McMurray, J 1999, *Organic Chemistry*, 5th edn, Brooks/Cole Publishing Co, London.

Pavia, D L, Lampman, G M & Kriz, G S 2001, *Introduction to Spectroscopy*, 3rd edn, Harcourt, (ISBN 0 03 031961 7)

Silverstein, R M & Webster, F X 1998, *Spectrometric Identification of Organic Compounds*, 6th edn, John Wiley, New York.

(ISBN 0-471- 13457-0)

Van Holde KE, Johnson WC, & Ho PS 2005, *Principles of Physical Biochemistry*, 2nd edn, Prentice Hall, New Jersey.

(ISBN 0-13-046-427-9)

## STUDENT WORKLOAD REQUIREMENTS

ACTIVITY	HOURS
Assessments	50.00
Examinations	2.00
Lectures	26.00
Private Study	70.00
Practical Experience or Problem Solving	30.00

## ASSESSMENT DETAILS

Description	Marks out of	Wtg (%)	Due date
PRACTICAL WORK	20.00	20.00	03 Mar 2008 (see note 1)
ASSIGNMENT 1	10.00	10.00	03 Mar 2008 (see note 2)
ASSIGNMENT 2	10.00	10.00	03 Mar 2008 (see note 3)
ASSIGNMENT 3	15.00	15.00	03 Mar 2008 (see note 4)
PRESENTATION	15.00	15.00	03 Mar 2008 (see note 5)
ASSIGNMENT 4	5.00	5.00	03 Mar 2008 (see note 6)
2 HOUR RESTRICTED EXAM	100.00	25.00	END S1 (see note 7)

### NOTES

1. Examiner will advise due dates for practical work.
2. Examiner will advise due date of Assignment 1.
3. Examiner will advise due date of Assignment 2.
4. Examiner will advise due date of Assignment 3.
5. Examiner to advise date of presentation.
6. Modertor (or Examiner) will advise due date for assignment 4.
7. 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. To maximize their chances of satisfying the objectives of the practical component of the course, students should attend and actively participate in the laboratory sessions in the course.
- 2 Requirements for students to complete each assessment item satisfactorily:

To complete each of the assignments satisfactorily, students must obtain at least 50% of the marks available for each assignment. To complete the examination satisfactorily, students must obtain at least 50% of the marks available for the examination. To complete the practical component satisfactorily, students must submit all the practical reports and obtain at least 50% of the marks available for each report submitted.
- 3 Penalties for late submission of required work:

If students submit assignments after the due date without (prior) approval of the examiner then a penalty of 5% of the total marks gained by the student for the assignment may apply for each working day late up to ten working days at which time a mark of zero may be recorded.. No assignments will be accepted after model answers have been posted.
- 4 Requirements for student to be awarded a passing grade in the course:

To be assured of receiving a passing grade a student must achieve at least 50% of the total weighted marks available for the course.
- 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.
- 7 Examination period when Deferred/Supplementary examinations will be held:

Any Supplementary or Deferred examinations for this course will be held at a time suitable to both the student and the course examiner but must occur no later than the end of the next examination period, and the examiner will advise students in writing of the date, time and location of any such examination.
- 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 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.
- 10 Students who do not perform satisfactorily in an examination, may, at the discretion of the examiner, be granted a supplementary examination.
- 11 In order to attend laboratory classes, students must provide and wear appropriate personal protective equipment. This shall include a laboratory coat, closed in shoes, and safety glasses. 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.