



UNIVERSITY
OF TASMANIA

School of Chemistry

Faculty of Science, Engineering and Technology

KRA306
Instrumental Chemistry III
Semester 2

2009

Unit Outline

Dr Trevor W Lewis

CRICOS Provider Code: 00586B

Contact details

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Unit summary

Unit code	KRA306
Unit title	Instrumental Chemistry III
Unit description	This is a Semester 2 unit conducted as an introduction to the fundamentals of instrumental analytical chemistry. One lecture per week is allocated to instrumental techniques that focus primarily on organic analysis (gas chromatography and high performance liquid chromatography, including ion chromatography) and one lecture per week on trace analysis of metals in solution (electrochemical and atomic techniques). Compulsory 4 hour practicals are run during Weeks 2 to 12 inclusive to emphasise critical aspects of the lecture course.
Teaching staff	Dr Andrew Seen (Organic analysis, flow injection analysis & ion chromatography) Dr Trevor Lewis (Electrochemistry & Atomic Techniques and Unit Coordinator)
Campus & mode	Launceston Campus by face to face teaching
Unit weight	12.5 %
Teaching pattern	Semester 2 Unit 3 x 1 hr lectures, and 1 x 4 hr practical per week
Prerequisites	KRA201 – Analytical Chemistry II
Mutual exclusions	KRA332 – Physical and Analytical Chemistry
Assessment	Examination 60% Tests 20% Practicals 20%
Required texts, etc	Skoog, Holler and Crouch, <i>Principles of Instrumental Analysis</i> , 6 th Ed, Thomson Brooks Cole: Belmont, 2007
Recommended reading	Sawyer, Sobkowiak, and Roberts, <i>Electrochemistry for Chemists</i> (2nd Edition), New York : Wiley, 1995. (541.37) Skoog and Leary <i>Principles of Instrumental Analysis</i> , 4th ed., Saunders: Philadelphia, 1992. (543.08) Skoog, D. A., Holler, F. J. and Nieman, T. A., <i>Principles of Instrumental Analysis</i> , 5 th edition, Saunders, 1998.

Other publications

Lab Manuals will be available from the Unit Co-ordinator.

Special Equipment

- Laboratory Coat.
- Safety Glasses.

Learning outcomes

On successful completion of this unit, students should be able to:

- (i) demonstrate an understanding of the chemical principles and theory of a number of methods of contemporary instrumental analysis, and, for each technique, be able to describe its instrumentation and methodology; its uses and applications; its advantages, disadvantages, limitations, sources of error, accuracy, sensitivity and sample requirements.
- (ii) demonstrate basic practical expertise in the use of a number of instrumental techniques for quantitative and qualitative analysis.
- (iii) select a particular technique, method or instrument capable of solving a given problem taking into account the complexity of the materials to be analysed, the concentration of the species of interest, the number of samples and the accuracy required.

Details of teaching arrangements

Unit schedule

Week	Date Starting	Thursday 10.00 – 10.50 Brooks LT8 Lecture	Thursday 11.00 – 11.50 Brooks LT8 Lecture	Thursday 13.10–17.00 S114 Prac
1	14 July	AJS	TWL	-
2	21 July	AJS	TWL	AJS (FIA)
3	28 July	AJS	TWL	TWL (MSDS)
4	4 Aug	AJS	TWL	-
5	11 Aug	AJS	TWL	TWL (Flame)
6	18 Aug	AJS	TWL	TWL (AA Furn/Elect)
7	25 Aug	TWL	AJS	TWL (AA Furn/Elect)
8	8 Sept	TWL	AJS	TWL (AA Furn/Elect)
9	15 Sept	TWL	AJS	AJS (GC)
10	22 Sept	TWL	AJS	AJS (GC)
11	29 Sept	TWL	AJS	AJS (HPLC)
12	6 Oct	TWL	AJS	TEST
13	13 Oct	TWL	AJS	AJS (Ion Chrom)

AJS: Dr Andrew Seen

TWL: Dr Trevor Lewis

Content

Chromatography (13 lectures, Andrew Seen)

Theoretical principles, column chromatography, high performance liquid chromatography, ion exchange chromatography, size exclusion chromatography, gas chromatography, GC-Mass Spectrometry, capillary electrophoresis, flow injection analysis.

Atomic Spectroscopy (6 lectures, Trevor Lewis)

Principles, instrumentation, practical considerations, applications and limitations of atomic spectroscopy to the trace analysis of metals in aqueous solution.

Electroanalytical chemistry (7 lectures, Trevor Lewis)

Fundamental principles, instrumentation, practical considerations, applications and limitations of voltammetric techniques for trace metal analysis.

Occupational health and safety (OH&S)

The University is committed to providing a safe and secure teaching and learning environment. In addition to specific requirements of this unit you should refer to the University's policy at: http://www.admin.utas.edu.au/hr/ohs/pol_proc/ohs.pdf

Safety rules for work in a chemical laboratory will be strictly enforced. General OH&S information related to a chemical laboratory will be given during the first laboratory session of each semester and in the Laboratory Manual. Specific information related to an individual practical will be given at the start of that practical.

Students will not be allowed to commence laboratory work unless they are wearing:
safety glasses or goggles,
a laboratory coat,
and enclosed shoes.

Learning expectations and strategies

Expectations

The University is committed to high standards of professional conduct in all activities, and holds its commitment and responsibilities to its students as being of paramount importance. Likewise, it holds expectations about the responsibilities students have as they pursue their studies within the special environment the University offers.

The University's Code of Conduct for Teaching and Learning states:

Students are expected to participate actively and positively in the teaching/learning environment. They must attend classes when and as required, strive to maintain steady progress within the subject or unit framework, comply with workload expectations, and submit required work on time.

Learning strategies

If you need assistance in preparing for study please refer to your tutor or lecturer. For additional information refer to the Learning Development website :
<http://www.utas.edu.au/learndev/>

If you will be using WebCT for the first time and would like some information on how to use WebCT refer to the following guide:
http://www.utas.edu.au/coursesonline/docs/using_webct.pdf

Specific attendance/performance requirements

Attendance at, and satisfactory performance in (ie a mark of >50%) at least 75% of the practicals is essential to be considered for a pass in this unit.

Furthermore, a passing grade (50% or more) for the overall examination mark as well as the practical component is mandatory for a passing grade in this unit.

Assessment details

Assessment task 1

Task description	Laboratory / tutorial reports
Task length	Write-up of 10 x 4 hr practical / tutorial sessions
Assessment criteria / guidelines	Marked on accuracy and precision in the lab, competence in chemical calculations and instrument operation, and questions related to content of prac
Date due	Written reports are due one week after completion of the prac

Quizzes and final examinations

Description / conditions	<p>One quiz will be conducted each semester during a normal lecture timeslot. These will be held in Week 12 of semester.</p> <p>One 3 hr examination will be conducted at the end of Semester 2</p> <p>In each case the student may take only writing materials and a calculator into the quiz/exam venue.</p>
Date	The final exam is conducted by the University Registrar in the formal examination period. See the <i>Current Students</i> homepage on the University's website.

How your final result is determined

The final mark for the unit consists of three components: Final Examination, Quizzes and Practicals. Their contribution to the final mark is given below:

Examination	60%
Tests	20%
Practicals	20%

Grades will be awarded based on your overall mark as follows:

Pass 50 – 59% overall, Credit 60 – 69% overall, Distinction 70 – 79% overall, High distinction 80 – 100% overall.

It is mandatory that you achieve a passing grade (50% or more) for the overall examination mark as well as the practical component to pass (or higher) this unit.

Requests for extensions

Any case for an extension of deadline for the submission of prac reports based on extenuating circumstances (such as a medical condition) must be made by the student **before** the due submission date.

It is important to note that the two tests each semester will be part of your continual assessment for this subject and, hence, are compulsory and that there is **no mechanism for early, late or repeat tests** to be run.

Penalties

A penalty of 10% of the assessed mark will be imposed for each working day that a laboratory report is late. Work submitted more than 10 working days late will not be marked.

Academic referencing

In your written work you will need to support your ideas by referring to scholarly literature. It is important that you understand how to correctly refer to the work of others and maintain academic integrity. Failure to appropriately acknowledge the ideas of others constitutes academic dishonesty (plagiarism), a matter considered by the University of Tasmania as a serious offence.

For information on presentation of assignments, including referencing styles:

<http://www.utas.edu.au/library/assist/gpoa/gpoa.html>

Please read and be guided by the following statement on plagiarism. Should you require clarification please see your unit coordinator or lecturer.

Plagiarism

Plagiarism is a form of cheating. It is taking and using someone else's thoughts, writings or inventions and representing them as your own; for example, using an author's words without putting them in quotation marks and citing the source, using an author's ideas without proper acknowledgment and citation, copying another student's work.

If you have any doubts about how to refer to the work of others in your assignments, please consult your lecturer or tutor for relevant referencing guidelines, and the academic integrity resources on the web at <http://www.utas.edu.au/tl/supporting/academicintegrity/index.html>. The intentional copying of someone else's work as one's own is a serious offence punishable by penalties that may range from a fine or deduction/cancellation of marks and, in the most serious of cases, to exclusion from a unit, a course or the University. Details of penalties that can be imposed are available in the Ordinance of Student Discipline – Part 3 Academic Misconduct, see <http://www.utas.edu.au/universitycouncil/legislation/>

The University reserves the right to submit assignments to plagiarism detection software, and might then retain a copy of the assignment on its database for the purpose of future plagiarism checking.

For further information on this statement and general referencing guidelines, see <http://www.utas.edu.au/plagiarism/>

Further information and assistance

If you are experiencing difficulties with your studies or assignments, have personal or life planning issues, disability or illness which may affect your course of study, you are advised to raise these with your lecturer in the first instance.

There is a range of University-wide support services available to you including Student Services, International Services and Learning Development. Please refer to the *Current Students* homepage at: <http://www.utas.edu.au/students/>

Should you require assistance in accessing the Library visit their website for more information at <http://www.utas.edu.au/library/>

The NEXUS Journal

The logo for the Nexus Journal, featuring the word "nexus" in a bold, lowercase, sans-serif font. The letter "x" is stylized with a red, curved line that loops around it, resembling a double helix or a molecular structure.

nexus: journal of undergraduate science, engineering, and technology is published annually and contains the work of undergraduates. This unit contains assignments that are suitable for submission to the journal. For more information, ask your lecturer, and see <http://www.utas.edu.au/scieng/nexus>.