School of Chemistry

CHEM914: Advanced Analytical Chemistry

Subject Outline
Autumn, 2016
On-Campus
Wollongong

Subject Information
Credit Points: 12
Pre-requisite(s): CHEM214/ Equivalent experience
Co-requisite(s): Nil
Restrictions: Nil
Contact Hours: 6 hour laboratory every second week, 3 hours lectures every week, plus 12 hours additional contact hours (tutorial/laboratory) for extension topics.

Subject Contacts
Subject Coordinator/Lecturer

<table>
<thead>
<tr>
<th>Name</th>
<th>A/Prof Clare Murphy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Building 18, Room 221</td>
</tr>
<tr>
<td>Telephone</td>
<td>61 2 4221 5065</td>
</tr>
<tr>
<td>Email</td>
<td><a href="mailto:clare_murphy@uow.edu.au">clare_murphy@uow.edu.au</a></td>
</tr>
<tr>
<td>Consultation mode and times:</td>
<td>Email for appointment</td>
</tr>
</tbody>
</table>

Student Support and Advice
For general enquiries please contact StudentHub 41:
Location: 41.138B
Telephone: 61 2 4221 3492
Email: smah-students@uow.edu.au
Student Consultation and Communication

University staff receive many emails each day. In order to enable them to respond to your emails appropriately and in a timely fashion, students are asked to observe basic requirements of professional communication:

*Please ensure that you include your full name and student number and identify your practical class or tutorial group in your email so that staff know who they are communicating with and can follow-up personally where appropriate.*

**Consider what the communication is about**

- Is your question addressed elsewhere (e.g. in the subject outline or, on the eLearning site)?
- Is it something that is better discussed in person or by telephone? This may be the case if your query requires a lengthy response or a dialogue in order to address. If so, see consultation times above and/or schedule an appointment.
- Are you addressing your request to the most appropriate person?

**Specific email subject title to enable easy identification of issue**

- Identify the subject code of the subject you are enquiring about (as staff may be involved in more than one subject) put this in the email subject heading. Add a brief, specific query reference after the subject code where appropriate.

**Professional courtesy**

- Address the staff member appropriately by name (and formal title if you do not yet know them).
- Use full words (avoid ‘text-speak’ abbreviations), correct grammar and correct spelling.
- Be respectful and courteous.
- Allow 3 – 4 working days for a response before following up. If the matter is legitimately urgent, you may wish to try telephoning the staff member (and leaving a voicemail message if necessary) or inquiring at the School Office.
Section A: General Information

Subject Learning Outcomes

On successful completion of this subject, students will be able to:

1. detail the steps involved in quantifying an analyte in a sample;
2. describe the criteria used for selecting a particular instrumental method;
3. outline the principles behind making a quantitative measurement in some commonly used instrumental methods;
4. understand the basic operation of each class of instrument and the chemical or physical property they measure;
5. explain the advantages and disadvantages of these methods for a particular sample;
6. use the literature to investigate the development of instrumental methods for specific sample types;
7. correctly operate a number of analytical instruments; and
8. be able to suggest suitable instrumental methods for selected analytical problems.

Subject Description

Chemical analysis is an essential part of solving problems in many scientific disciplines. In addition to its application to problem solving, analytical chemists are also interested in improving the way chemical analysis is performed, by making it faster, cheaper, more sensitive and less susceptible to interference. As a result, a vast array of instrumental methods has been developed, each one having its own strengths and weaknesses in a given application. In this subject, our interest is not in the numerical results of chemical analyses, but rather how we obtain these numbers and evaluate their reliability. The principles underlying common instrumental methods will be discussed in lectures, specifically: the measurement technique; instrument development and components; application of the instrument to analysis; and advantages and limitations of the instruments. The accompanying laboratory component will provide an opportunity for hands-on experience with analytical instrumentation.

eLearning Space

This subject has materials and activities available via eLearning. To access eLearning you must have a UOW user account name and password, and be enrolled in the subject. eLearning is accessed via SOLS (student online services). Log on to SOLS and then click on the eLearning link in the menu column. For information regarding the eLearning spaces please use the following link:

http://uowblogs.com/moodlelab/files/2013/05/Moodle_StudentGuide-1petpo7.pdf

Lecture, Tutorial, Laboratory Times

All timetable information is subject to variation. Check latest timetabling information on the 'Current Student' webpage on UOW website or log into SOLS to view your personal timetable prior to attending classes. http://www.uow.edu.au/student/index.html

Timetable information can be accessed from

Key University Dates can be accessed from

Readings, References and Materials

Textbooks
Nil

Prescribed Readings (includes eReadings)
Nil
Materials
Laboratory Coat
Safety Glasses
UOW Approved Calculator

Recommended Readings
The following references complement the prescribed readings and textbooks:

Students may find the CHEM 214 text useful:


Recommended readings are not intended as an exhaustive list, students should use the Library catalogue and databases to locate additional resources.

Recent Changes to this Subject
i. Nil

List of Topics Covered
The following are examples of the topics to be covered in this course. This is not an exhaustive list and will be subject to change.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement Basics</td>
<td>Discussion of the fundamental principles that underlie all quantitative chemical measurements. Laboratory calculations.</td>
</tr>
<tr>
<td>Sample Preparation &amp; Introduction to Instruments Used</td>
<td>Sample preparation techniques and an overview of the instruments used in the laboratory exercises</td>
</tr>
<tr>
<td>Chemometrics, Calibration &amp; QA/QC</td>
<td>Calibration of instruments, signal-to-noise, data manipulation, method validation &amp; traceability.</td>
</tr>
<tr>
<td>Analytical Spectroscopy 1</td>
<td>UV-visible spectroscopy, grating equations and Fourier transform IR spectroscopy</td>
</tr>
<tr>
<td>Critical review of Scientific Paper</td>
<td>Critically review a scientific paper based upon quantitative analytical measurements &amp; make poster.</td>
</tr>
<tr>
<td>Surface Plasma Resonance</td>
<td>Modern visualisation techniques</td>
</tr>
<tr>
<td>Instrumental techniques</td>
<td>A hands-on look at chemical measurement methods</td>
</tr>
</tbody>
</table>
Section B: Assessment

Assessment Summary

<table>
<thead>
<tr>
<th>Assessment Item</th>
<th>Form of Assessment</th>
<th>Due Date</th>
<th>Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment 1</td>
<td>Practical Work (4 x laboratory reports)</td>
<td>To be advised</td>
<td>12%</td>
</tr>
<tr>
<td>Assessment 2</td>
<td>Laboratory Quiz</td>
<td>To be advised</td>
<td>3%</td>
</tr>
<tr>
<td>Assessment 3</td>
<td>Critical review of Scientific Paper</td>
<td>To be advised</td>
<td>5%</td>
</tr>
<tr>
<td>Assessment 4</td>
<td>Mid-session Quiz</td>
<td>To be advised</td>
<td>5%</td>
</tr>
<tr>
<td>Assessment 5</td>
<td>Extension topic 1 Quiz</td>
<td>To be advised</td>
<td>12.5%</td>
</tr>
<tr>
<td>Assessment 6</td>
<td>Extension topic 2</td>
<td>To be advised</td>
<td>12.5%</td>
</tr>
<tr>
<td>Assessment 7</td>
<td>Practical Examination</td>
<td>Week 12 or 13</td>
<td>20%</td>
</tr>
<tr>
<td>Assessment 8</td>
<td>Final Examination</td>
<td>During exam period</td>
<td>30%</td>
</tr>
<tr>
<td>Total Marks</td>
<td></td>
<td></td>
<td>100%</td>
</tr>
</tbody>
</table>

Details of Assessment Tasks

Assessment tasks will be marked using explicit criteria that will be provided to students prior to submission.

Assessment 1
- Practical Work (4 x laboratory reports)
  - Due date: To be confirmed
  - Weighting: 12% (3% for each report)
  - Submission: Submit a hardcopy to the lockbox outside the laboratory
  - Type of Collaboration: Individual Assessment
  - Length: As required
  - Details: 4 reports and one tutorial question quiz early in session
  - Style and format: Reports and quiz
  - Subject learning outcomes: 1,2,3,4,5,7,8

Assessment 2
- Laboratory Quiz
  - Due date: To be confirmed
  - Weighting: 3%
  - Submission: Submit a hardcopy of your assessment to your tutor/demonstrator in class
  - Type of Collaboration: Individual Assessment
  - Length: ~ 1 hour (to be confirmed)
  - Details: Short answer quiz on laboratory calculations
  - Style and format: In-class test
  - Subject learning outcomes: 1,2,3,4,5,7,8

Assessment 3
- Critical review of Scientific Paper
  - Due date: To be confirmed
  - Weighting: 5%
  - Submission: Submit a hardcopy of your poster and attend oral examination.
  - Type of Collaboration: Group Project
  - Length: 2-3 hours
  - Details: Attendance is compulsory
  - Style and format: Poster/presentation
  - Subject learning outcomes: 6
### Assessment 4
- **Due date**: To be confirmed
- **Weighting**: 5%
- **Submission**: Exam papers and answers must be submitted at the conclusion of the exam.
- **Type of Collaboration**: Individual Assessment
- **Length**: 1 hour
- **Details**: Quiz on lecture material covered in first half of semester
- **Style and format**: Quiz - short answers
- **Subject learning outcomes**: 1,2,3,4,5,7,8

### Assessment 5
- **Due date**: To be confirmed
- **Weighting**: 12.5%
- **Submission**: Exam papers and answers must be submitted at the conclusion of the exam.
- **Type of Collaboration**: Individual Assessment
- **Length**: Approximately 1 hour
- **Details**: Extension topic 1 quiz
- **Style and format**: Quiz - short answers
- **Subject learning outcomes**: 3,4,5,8

### Assessment 6
- **Due date**: To be confirmed
- **Weighting**: 12.5%
- **Submission**: Presentation on review of scientific paper
- **Type of Collaboration**: Individual Assessment
- **Length**: Approximately 20 minutes
- **Details**: Report and or presentation of review
- **Style and format**: Presentation
- **Subject learning outcomes**: 6

### Assessment 7
- **Due date**: Week 12 or 13 (to be confirmed)
- **Weighting**: 20%
- **Submission**: Exam papers and answers must be submitted at the conclusion of the exam.
- **Type of Collaboration**: Individual Assessment
- **Length**: 2.5 hours (to be confirmed)
- **Details**: Laboratory based examination
- **Style and format**: Practical Examination
- **Subject learning outcomes**: 1,2,3,4,5,7,8

### Assessment 8
- **Due date**: During exam period
- **Weighting**: 30%
- **Submission**: Exam papers and answers must be submitted at the conclusion of the exam.
- **Type of Collaboration**: Individual Assessment
- **Length**: 3 hours
- **Details**: Short answer examination on all material covered in subject
- **Style and format**: Final exam
- **Subject learning outcomes**: 1,2,3,4,5,7,8
Minimum Requirements for a Pass in this Subject

To receive a clear pass in this subject a total mark of 50% or more must be achieved. In addition, failure to meet any of the minimum performance requirements is grounds for awarding a Technical Fail (TF) in the subject, even where total marks accumulated are greater than 50%.

The minimum performance requirements for this subject are:

- Pass the practical component
- Complete at least 75% of practical assessments (including any assessment where academic consideration is approved)
- Obtain a mark of at least 50% on the final examination

Minimum Student Attendance and Participation

It is expected that students will allocate 24 hours per week to this subject, including any required class attendance, completion of prescribed readings and assessment tasks.

Student attendance at practicals is compulsory and students must attend at least 100% of classes. Absences will require the submission of an application for Academic Consideration via SOLS and the presentation of suitable documentation, for example a Medical Certificate, to Student Central as soon as practical. For further details about applying for academic consideration visit the Student Central webpage: [http://www.uow.edu.au/student/central/academicconsideration/index.html](http://www.uow.edu.au/student/central/academicconsideration/index.html)

Scaling

Scaling may occur in this subject at the end of session by the Unit Assessment Committee and/or Faculty Assessment Committee (FAC). Marks will only be scaled to ensure fairness/parity of marking across groups of students. Scaling will not affect any individual student’s rank order within their cohort. For more information refer to Assessment Guidelines – Scaling: [http://www.uow.edu.au/about/policy/UOW058609.html](http://www.uow.edu.au/about/policy/UOW058609.html)

Late Submission

Late submission of an assessment task without an approved extension of the deadline is not acceptable. If you are unable to submit an assessment due to extenuating circumstances (e.g. medical grounds or compassionate grounds), you can make an application of academic consideration. Not all circumstances qualify for academic consideration. For further details about applying for academic consideration visit the Student Central webpage: [http://www.uow.edu.au/student/central/academicconsideration/index.html](http://www.uow.edu.au/student/central/academicconsideration/index.html)

All assessment tasks are to be submitted on the due dates as specified in this Subject Outline. Assessment tasks submitted late will be penalised by the deduction of 20% of the maximum possible mark for the assessment task per calendar week or part thereof. Deduction of marks will not result in a negative mark.

Note that assessment tasks submitted to Science Central must be submitted by 4:30 pm on the due date to guarantee being recorded in SATS as being submitted on time.

System of Referencing Used for Written Work

The Author-Date (Harvard) referencing system should, unless otherwise specified for a particular assessment (check Details of Assessment Tasks), be utilised. A summary of the Harvard system can be accessed on the Library website at: [http://public01.library.uow.edu.au/refcite/style-guides/html/](http://public01.library.uow.edu.au/refcite/style-guides/html/)
Use of Internet Sources

Students are able to use the Internet to access the most current information on relevant topics and information. Internet sources should only be used after careful critical analysis of the currency of the information, the role and standing of the sponsoring institution, reputation and credentials of the author, the clarity of the information and the extent to which the information can be supported or ratified by other authoritative sources.

Plagiarism

The full policy on Academic Integrity and Plagiarism is found in the Policy Directory on the UOW website.

“The University’s Academic Integrity and Plagiarism Policy, Faculty Handbooks and subject guides clearly set out the University’s expectation that students submit only their own original work for assessment and avoid plagiarising the work of others or cheating. Re-using any of your own work (either in part or in full) which you have submitted previously for assessment is not permitted without appropriate acknowledgement. Plagiarism can be detected and has led to students being expelled from the University.

The use by students of any website that provides access to essays or other assessment items (sometimes marketed as ‘resources’), is extremely unwise. Students who provide an assessment item (or provide access to an assessment item) to others, either directly or indirectly (for example by uploading an assessment item to a website) are considered by the university to be intentionally or recklessly helping other students to cheat. This is considered academic misconduct and students place themselves at risk of being expelled from the University.”

Submission of Assessments

Refer to the submission requirements under the details of the individual assessments. Students should ensure that they receive a receipt/evidence acknowledging assessment submission. Students will be required to produce this in the event that an assessment task is considered to be lost. Students are also expected to keep a copy of all their submitted assignments in the event that re-submission is required.

Assessment Return

Students will be notified when they are able to view their marked assessment. In accordance with University Policy marked assignments will usually only be held for 21 days after the declaration of marks for that assignment.
Section C: General Advice

Students should refer to the Faculty of Science, Medicine and Health website for information on policies, learning and support services and other general advice.

University Policies

Students should be familiar with the following University policies:

a. Code of Practice – Teaching and Assessment

b. Code of Practice – Research, where relevant

c. Code of Practice – Honours, where relevant

d. Student Charter

e. Code of Practice – Student Professional Experience, where relevant

f. Academic Integrity and Plagiarism Policy

g. Student Academic Consideration Policy

h. Course Progress Policy

i. Graduate Qualities Policy

j. Academic Complaints Policy (Coursework and Honours Students)

k. Policy and Guidelines on Non-Discriminatory Language Practice and Presentation

l. Workplace Health and Safety, where relevant

m. Intellectual Property Policy

n. IP Student Assessment of Intellectual Property Policy, where relevant

o. Policy on Ethical Objection by Students to the Use of Animal and Animal Products in Coursework Subjects, where relevant

p. Human Research Ethics Guidelines, where relevant

q. Animal Research Guidelines, where relevant
r. Student Conduct Rules and accompanying Procedures or Research Misconduct Policy for research students

Student Support Services and Facilities
Students can access information on student support services and facilities at the following link. This includes information on “Academic Support”, “Starting at University, “Help at University” as well as information and support on “Career’s and Jobs”. http://www.uow.edu.au/student/services/index.html

Student Etiquette
Guidelines on the use of email to contact teaching staff, mobile phone use in class and information on the university guide to eLearning ‘Netiquette’ can be found at http://www.uow.edu.au/student/elearning/netiquette/index.html

Version Control Table

<table>
<thead>
<tr>
<th>Version Control</th>
<th>Release Date</th>
<th>Author/Reviewer</th>
<th>Approved By</th>
<th>Amendment</th>
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<tr>
<td>2</td>
<td>20160302</td>
<td>A/Prof Clare Murphy – Subject Coordinator</td>
<td>Sonia Losinno – ADE Nominee</td>
<td>Amend List of Topics and Assessment 6</td>
</tr>
<tr>
<td>1</td>
<td>20151216</td>
<td>A/Prof Clare Murphy – Subject Coordinator</td>
<td>Sonia Losinno – ADE Nominee</td>
<td>Final CHEM914 Autumn 2016 Subject Outline</td>
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