



UNSW Course Outline

CHEM2011 Physical Chemistry: Molecules, Energy and Change - 2024

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General Course Information

Course Code : CHEM2011

Year : 2024

Term : Term 2

Teaching Period : T2

Is a multi-term course? : No

Faculty : Faculty of Science

Academic Unit : School of Chemistry

Delivery Mode : In Person

Delivery Format : Standard

Delivery Location : Kensington

Campus : Sydney

Study Level : Undergraduate

Units of Credit : 6

Useful Links

[Handbook Class Timetable](#)

Course Details & Outcomes

Course Description

This 2nd year chemistry subject develops students' understanding of Physical Chemistry, which

seeks to explain chemical processes in terms of energy changes and the molecular nature of matter. This course introduces quantum mechanics and its role in determining the energy levels of atoms and molecules. The course then introduces the molecular basis underpinning the laws of thermodynamics and their applications in chemistry, with specific attention given to the application of thermodynamics to electrochemical processes. Finally, the course then introduces the physical basis for understanding the factors affecting reaction rates, the role of reaction mechanisms, and molecular theory of reaction rates. Content is delivered through recorded lectures and reinforced through in-person workshops and laboratories.

Course Aims

The aim of this course is to introduce students to the principles of chemical thermodynamics, quantum mechanics, and chemical kinetics. A working knowledge of these is essential for an understanding of the conditions and techniques used to bring about chemical changes in industry and in the laboratory and for understanding all chemical reactions, including those in the environment and living organisms.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Interpret the vibronic spectra of molecules using quantum mechanics.
CLO2 : Identify and apply laws and principles of thermodynamics to calculate the thermodynamic properties of chemical reactions.
CLO3 : Understand the factors affecting chemical reaction rate and apply chemical kinetics assumptions to determine rate laws.
CLO4 : Conduct physical chemistry experiments then analyse, report and draw conclusions from the quantitative data obtained.

Course Learning Outcomes	Assessment Item
CLO1 : Interpret the vibronic spectra of molecules using quantum mechanics.	• Quantum Mechanics & Spectroscopy Exam
CLO2 : Identify and apply laws and principles of thermodynamics to calculate the thermodynamic properties of chemical reactions.	• Thermodynamics Exam
CLO3 : Understand the factors affecting chemical reaction rate and apply chemical kinetics assumptions to determine rate laws.	• Kinetics Exam • Thermodynamics Exam
CLO4 : Conduct physical chemistry experiments then analyse, report and draw conclusions from the quantitative data obtained.	• Laboratory Reports

Learning and Teaching Technologies

Moodle - Learning Management System | Microsoft Teams | Echo 360

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Laboratory Reports Assessment Format: Individual	40%	Due Date: See Moodle
Thermodynamics Exam Assessment Format: Individual	20%	Due Date: See Moodle
Kinetics Exam Assessment Format: Individual	20%	Due Date: See Moodle
Quantum Mechanics & Spectroscopy Exam Assessment Format: Individual	20%	Due Date: See Moodle

Assessment Details

Laboratory Reports

Assessment Overview

You will be assessed on your laboratory work each week by submitting a laboratory report the following week in the form of an online quiz. The feedback will prepare you for your final laboratory report that you will submit in Week 11.

Hurdle: You must attend 7 out of 8 laboratory classes to meet the pass requirement for this course. You must have a grade of 50% or greater in the laboratory assessment to pass the course.

Course Learning Outcomes

- CL04 : Conduct physical chemistry experiments then analyse, report and draw conclusions from the quantitative data obtained.

Detailed Assessment Description

Each week, the laboratory teaching staff will assess your competency in the core skills learned.

Hurdle: You must attend 7 out of 8 laboratory classes and satisfy all core competencies to meet the pass requirement for this course. You must have a grade of 50% or greater in the laboratory assessment to pass the course.

Hurdle rules

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Thermodynamics Exam

Assessment Overview

The second test is a summative assessment of the learning outcomes for the topics covered in weeks 4-7 inclusive (lecture material only). The midterm test will be scheduled in week 8 as a single attempt with a time limit of 60 minutes. Details will be confirmed during the course.

Feedback is provided within two weeks of the test completion.

Course Learning Outcomes

- CLO2 : Identify and apply laws and principles of thermodynamics to calculate the thermodynamic properties of chemical reactions.
- CLO3 : Understand the factors affecting chemical reaction rate and apply chemical kinetics assumptions to determine rate laws.

Detailed Assessment Description

The second test is a summative assessment of the learning outcomes for the topics covered in weeks 4-7 inclusive (lecture material only). The midterm test will be scheduled in week 8 as a single attempt with a time limit of 60 minutes. Details will be confirmed during the course.

Feedback is provided within two weeks of the test completion.

Hurdle rules

You must get a total mark >35% across the three exams in order to receive a passing grade.

Kinetics Exam

Assessment Overview

The final test is a summative assessment of the learning outcomes for the topics covered in weeks 8-9 inclusive (lecture material only). The midterm test will be scheduled in week 10 as a single attempt with a time limit of 60 minutes. Details will be confirmed during the course.

Course Learning Outcomes

- CLO3 : Understand the factors affecting chemical reaction rate and apply chemical kinetics assumptions to determine rate laws.

Detailed Assessment Description

The final test is a summative assessment of the learning outcomes for the topics covered in weeks 8-9 inclusive (lecture material only). The midterm test will be scheduled in week 10 as a single attempt with a time limit of 60 minutes. Details will be confirmed during the course.

Hurdle rules

You must get a total mark $>35\%$ across the three exams in order to receive a passing grade.

Quantum Mechanics & Spectroscopy Exam

Assessment Overview

The first test is a summative assessment of the learning outcomes for the topics covered in weeks 1-3 inclusive (lecture material only). The midterm test will be scheduled in week 4 as a single attempt with a time limit of 60 minutes. Details will be confirmed during the course.

Feedback is provided within two weeks of the test completion.

Course Learning Outcomes

- CL01 : Interpret the vibronic spectra of molecules using quantum mechanics.

Detailed Assessment Description

The first test is a summative assessment of the learning outcomes for the topics covered in weeks 1-3 inclusive (lecture material only). The midterm test will be scheduled in week 4 as a single attempt with a time limit of 60 minutes. Details will be confirmed during the course.

Feedback is provided within two weeks of the test completion.

Hurdle rules

You must get a total mark $>35\%$ across the three exams in order to receive a passing grade.

General Assessment Information

Grading Basis

Standard

Requirements to pass course

To be awarded a PASS or higher grade, you must meet all of these requirements:

- Attend $\geq 80\%$ of lab classes i.e. 7 out of 8 (no unexplained absences)
- A total mark $\geq 50\%$
- Satisfactory overall performance ($\geq 35\%$) across all exams i.e. 21 out of 60
- A mark of $\geq 50\%$ in the laboratory components i.e. 20 out of 40

Course Schedule

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Christopher Hansen				By appointment	Yes	Yes
Lecturer	Scott Kable				By appointment	No	No
	Laura McKemish				By appointment	No	No

Other Useful Information

Academic Information

Upon your enrolment at UNSW, you share responsibility with us for maintaining a safe, harmonious and tolerant University environment.

You are required to:

- Comply with the University's conditions of enrolment.
- Act responsibly, ethically, safely and with integrity.
- Observe standards of equity and respect in dealing with every member of the UNSW community.
- Engage in lawful behaviour.
- Use and care for University resources in a responsible and appropriate manner.
- Maintain the University's reputation and good standing.

For more information, visit the [UNSW Student Code of Conduct Website](#).

Academic Honesty and Plagiarism

Referencing is a way of acknowledging the sources of information that you use to research your assignments. You need to provide a reference whenever you draw on someone else's words, ideas or research. Not referencing other people's work can constitute plagiarism.

Further information about referencing styles can be located at <https://student.unsw.edu.au/referencing>

Academic integrity is fundamental to success at university. Academic integrity can be defined as a commitment to six fundamental values in academic pursuits: honesty, trust, fairness, respect, responsibility and courage. At UNSW, this means that your work must be your own, and others' ideas should be appropriately acknowledged. If you don't follow these rules, plagiarism may be detected in your work.

Further information about academic integrity, plagiarism and the use of AI in assessments can be located at:

- The [Current Students site](#),
- The [ELISE training site](#), and
- The [Use of AI for assessments](#) site.

The Student Conduct and Integrity Unit provides further resources to assist you to understand your conduct obligations as a student: <https://student.unsw.edu.au/conduct>

Submission of Assessment Tasks

Penalty for Late Submissions

UNSW has a standard late submission penalty of:

- 5% per day,
- for all assessments where a penalty applies,
- capped at five days (120 hours) from the assessment deadline, after which a student cannot submit an assessment, and
- no permitted variation.

Any variations to the above will be explicitly stated in the Course Outline for a given course or assessment task.

Students are expected to manage their time to meet deadlines and to request extensions as early as possible before the deadline.

Special Consideration

If circumstances prevent you from attending/completing an assessment task, you must officially apply for special consideration, usually within 3 days of the sitting date/due date. You can apply by logging onto myUNSW and following the link in the My Student Profile Tab. Medical documentation or other documentation explaining your absence must be submitted with your application. Once your application has been assessed, you will be contacted via your student email address to be advised of the official outcome and any actions that need to be taken from there. For more information about special consideration, please visit: [https://](#)

Important note: UNSW has a “fit to sit/submit” rule, which means that if you sit an exam or submit a piece of assessment, you are declaring yourself fit to do so and cannot later apply for Special Consideration. This is to ensure that if you feel unwell or are faced with significant circumstances beyond your control that affect your ability to study, you do not sit an examination or submit an assessment that does not reflect your best performance. Instead, you should apply for Special Consideration as soon as you realise you are not well enough or are otherwise unable to sit or submit an assessment.

Faculty-specific Information

Additional support for students

- [The Current Students Gateway](#)
- [Student Support](#)
- [Academic Skills and Support](#)
- [Student Wellbeing, Health and Safety](#)
- [Equitable Learning Services](#)
- [UNSW IT Service Centre](#)
- Science EDI Student [Initiatives](#), [Offerings](#) and [Guidelines](#)

School-specific Information

UNSW Changes to Special Consideration: Short Extension

The School of Chemistry has carefully reviewed all of its assessments to determine whether they are suitable for automatic short extensions as set out by the UNSW Short Extension Policy. The current deadline structures for all assessment tasks in the School of Chemistry already accommodate the possibility of unexpected circumstances that may lead students to require additional time for submission. **The School of Chemistry has opted out of the UNSW Short Extension provision for all its courses**, and we have already integrated flexibility into our assessment deadlines. This decision is subject to revision in response to the introduction of new course offerings. All students may still apply for Special Consideration for any assessment via the usual procedures.

School Contact Information

Level 1, Dalton Building (F12)

W: www.chemistry.unsw.edu.au

Also see: ***Contacts and Support*** section of the course Moodle page (where applicable)