

## EPCHEM 237: Physical and Organic Chemistry

Online

Semester 2 - 2023



THE UNIVERSITY OF  
NEWCASTLE  
AUSTRALIA

*The Pathways and Academic Learning Support Centre recognises and respects the unique history and culture of Aboriginal and Torres Strait Islander peoples and their unbroken relationship with the lands and the waters of Australia over millennia. We are dedicated to reconciliation and to offering opportunities for Aboriginal and Torres Strait Islander peoples to access and succeed in higher education. The Centre is committed to providing a culturally safe and inclusive environment for all.*

## OVERVIEW

### Course Description

This course aims to increase knowledge and awareness of the significant role that chemistry plays in everyday life. It strikes a balance between theory and real-life examples. Students will be introduced to diverse ways of representing the physical world. Topics include analytical chemistry; the gas laws; chemical equilibria; thermodynamics; oxidation and reduction; electrochemistry; and organic chemistry. The course equips students with problem solving, critical thinking and analytical skills and prepares them for undergraduate study at the University level. Resource materials are presented in ways which introduce students to different learning styles.

### Requisites

If you have successfully completed or are enrolled in EPHLTH270, EPHLTH370 or EPCHEM314 you cannot enrol in this course.

To enrol in this course, students must be enrolled in or have successfully completed EPCHEM137.

### Contact Hours

#### Self-Directed Learning

Self-Directed

2 hour(s) per Week for 12 Weeks

Self-Directed learning is equivalent to face-to-face contact hours. It involves engagement with course materials that are delivered at a time that suits you via short videos, course notes, podcasts, readings and other activities.

#### Tutorial

Online

1 hour(s) per Week for 12 Weeks

#### Workshop

Face to Face On Campus

6 hour(s) per Term Full Term

### Unit Weighting

10

### Workload

Students are required to spend on average 120-140 hours of effort (contact and non-contact) including assessments per 10 unit course.

# COURSE OUTLINE

[www.newcastle.edu.au](http://www.newcastle.edu.au)

CRICOS Provider 00109J

# CONTACTS

<b>Course Coordinator</b>	Dr Zoë Griffiths <a href="mailto:Zoe.Griffiths@newcastle.edu.au">Zoe.Griffiths@newcastle.edu.au</a> Consultation: Please email to schedule an appointment.	
<b>Teaching Staff</b>	Other teaching staff will be advised on the course Canvas site.	
<b>School Office</b>	<b>Callaghan</b> Ground Floor, General Purpose Building (GP) Ph: 02 4921 5558 <a href="mailto:enabling@newcastle.edu.au">enabling@newcastle.edu.au</a>	<b>Ourimbah</b> HO 168, Humanities Building Ph: 02 4348 4076 <a href="mailto:enabling@newcastle.edu.au">enabling@newcastle.edu.au</a>

# SYLLABUS

<b>Course Content</b>	<ul style="list-style-type: none"><li>• Atomic structure, orbitals and D-block chemistry</li><li>• How chemists use numbers</li><li>• The mole and applications in chemistry</li><li>• The gas laws</li><li>• Chemical equilibria and oxidation and reduction</li><li>• Thermodynamics and enthalpy</li><li>• Organic chemistry and isomers</li></ul>
<b>Course Learning Outcomes</b>	<p><b>On successful completion of this course, students will be able to:</b></p> <ol style="list-style-type: none"><li>1. Express chemical ideas in a logical, coherent fashion.</li><li>2. Work individually and in groups in both practical and theoretical contexts and in the verbal communication of scientific ideas.</li><li>3. Research existing chemical theory and apply scientific method in practical contexts.</li><li>4. Critically analyse and apply theoretical knowledge in the interpretation of chemical data.</li><li>5. Solve simple problems in both practical and theoretical contexts.</li></ol>
<b>Course Materials</b>	<p><b>Lecture Materials:</b></p> <ul style="list-style-type: none"><li>- All lecture materials will be provided on the Canvas site.</li></ul> <p><b>Recommended Texts:</b></p> <p><b>Hard copy text</b></p> <p>Burdge, J, Driessen, M. (2020). <i>Introductory Chemistry: An atoms first approach</i>. McGraw-Hill. NY. ISBN 9781-260-56586-7.</p> <p><b>E-Text</b></p> <p>The smart book version and e-Connect learning platform will be incorporated into Canvas for students to access online. Smart Book contains the same content as the print text, but actively tailors the content to the needs of the individual. Available on smartphones and tablets as well. Instructions for registering and accessing your e-book will be included in Canvas and will be demonstrated in the first lecture.</p>

# SCHEDULE

Week	Week Begins	Topic	Learning Activity	Assessment Due
1	17 Jul	How do chemists Use Numbers for: Measurement, Scientific notation, Significant figures, Unit conversions, Graphing measured data.	Tutorial 1 (Chapter 4 Pages 122-162)	
2	24 Jul	Atomic structure, orbital shapes, quantum numbers, effective nuclear charge, D-block chemistry.	Tutorial 2 (Chapter 2 Pages 41-61)	
3	31 Jul	Energy; thermodynamics, heat capacity, enthalpy; heat capacity; The 1st law of thermodynamics.	Tutorial 3 (Chapter 7 Pages 253-261)	Online Quiz 1 closes Sunday 11:59pm
4	7 Aug	Enthalpy, Hess' Law and heat of formation.	Tutorial 4	Online Quiz 2 closes Sunday 11:59pm
5	14 Aug	The mole and applications in chemistry. How calculations are used in chemistry.	Tutorial 5 (Chapter 5 Pages 162-192)	Online Quiz 3 closes Sunday 11:59pm
6	21 Aug	Oxidation and reduction reactions.  Identifying redox equations, calculating oxidation numbers, Writing redox equations in aqueous acidic conditions.	Tutorial 6 (Chapter 10 Pages 361-372)	Online Quiz 4 closes Sunday 11:59pm
7	28 Aug	The properties of gases and combined gas laws.	Tutorial 7 (Chapter 8 Pages 268-290)	Mid Semester Friday 1 <sup>st</sup> September online.  Online Quiz 5 closes Sunday 11:59pm
8	4 Sep	Gas laws, partial pressures, and gas stoichiometry.	Tutorial 8 (Chapter 8 Pages 292-308)	Online Quiz 6 closes Sunday 11:59pm
9	11 Sep	Introductory organic chemistry. Introductory biochemistry. Proteins, carbohydrates, nucleic acids.	Tutorial 9 (Chapter 14 Pages 480-498, Chapter 15, 506-518)  <b>Lab session 1 - Analytical Chemistry</b>	Online Quiz 7 closes Sunday 11:59pm  Lab report 1 due Sunday 17 <sup>th</sup> Sept 11:59pm
10	18 Sep	Organic chemistry II.  E & Z isomers, chirality and stereochemistry.	Tutorial 10  <b>Lab session 2 – Enthalpy and specific heat</b>	Online Quiz 8 closes Sunday 11:59pm  Lab report 2 due Sunday 24 <sup>th</sup> Sept 11:59pm

Mid Term Break				
Mid Term Break				
11	9 Oct	Reactions of organic chemistry. Markovnikov and Zaitsev's rule.  See CANVAS site for resources	Tutorial 11  <b>Lab session 3 - Reactions of Organic compounds</b>	Online Quiz 9 closes Sunday 11:59pm  Lab report 3 due Sunday 15 <sup>th</sup> October 11:59pm
12	16 Oct	Equilibrium, reaction rate, Le Châteliers's principle, calculating equilibrium concentrations and constants.	Tutorial 12  (Chapter 13 Pages 454-479)	Online Quiz 10 closes Sunday 11:59pm
13	23 Oct	Self-directed study		Online Quiz 11 and 12 closes Sunday 11:59pm
Examination Period				
Examination Period				

## ASSESSMENTS

This course has 4 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Mid-semester Test	Friday 1 <sup>st</sup> September (Week 7)	Individual	20%	1, 2, 3, 4
2	Online Quizzes	Weeks 3 – 13 Sunday 11:59pm	Individual	20%	1, 2, 4, 5
3	Lab Reports	Lab report 1: End of week 9 (11:59pm Sunday 17 <sup>th</sup> September) Lab report 2: End of week 10 (11:59pm Sunday 24 <sup>th</sup> September) Lab report 3: End of week 11 (11:59pm Sunday 15 <sup>th</sup> October)	Group	20%	1, 2, 3, 4
4	Final Examination	Examination period	Individual	40%	1, 2, 3, 4

### Late Submissions

The mark for an assessment item submitted after the designated time on the due date, without an approved extension of time, will be reduced by 5% of the possible maximum mark for that assessment item for each day or part day that the assessment item is late. Note: this applies equally to week and weekend days.

## Assessment 1 - Mid-semester Test

<b>Assessment Type</b>	In Term Test
<b>Purpose</b>	Assess a student's understanding of the material covered in Weeks 1-6.
<b>Description</b>	A one-hour test will be held online in Week 7. The test will consist of short answer questions. This test will be based on all material covered in lectures and tutorials from Weeks 1-6, inclusive.
<b>Weighting</b>	20% (1.67% for each quiz)
<b>Due Date</b>	1 <sup>st</sup> September (Week 7)
<b>Length</b>	One (1) hour
<b>Submission Method</b>	Online
<b>Return Method</b>	Online
<b>Feedback Provided</b>	Online

## Assessment 2 - Online Quizzes

<b>Assessment Type</b>	Quiz
<b>Description</b>	Students will complete a series of online quizzes. Twelve (12) online quizzes, completed via Canvas, will be used to assess a student's knowledge of key concepts relevant to chemistry. Each quiz consists of 10 multiple choice and/or short answer questions based on material contained in the lectures and required readings for each weekly topic. Quizzes will be available on a weekly basis and each must be completed within 60 minutes.
<b>Weighting</b>	20% (1.67% for each quiz)
<b>Due Date</b>	Weeks 3 – 13 Sunday 11:59pm
<b>Submission Method</b>	Online
<b>Return Method</b>	Online
<b>Feedback Provided</b>	Online

## Assessment 3 - Lab Reports

<b>Assessment Type</b>	Tutorial / Laboratory Exercises
<b>Description</b>	Three online laboratory sessions will be undertaken in Weeks 9, 10 and 11 to familiarise students with the chemistry laboratory and the practices undertaken. The sessions will relate directly to course content covered in lectures to promote blending theory and practice. This will be of benefit for students entering any undergraduate science degree.
<b>Weighting</b>	20%
<b>Due Date</b>	Weeks 9, 10 and 11 - Sunday 11:59pm
<b>Submission Method</b>	Online
<b>Return Method</b>	Online
<b>Feedback Provided</b>	Online

## Assessment 4 - Final Examination

<b>Assessment Type</b>	Formal Examination
<b>Description</b>	This exam is open book. The final exam is designed to give students the opportunity to demonstrate an understanding of fundamental chemical concepts, solve simple problems and be apply chemical knowledge in an examination setting. The final exam is held during the University Formal examination period and consists of multiple choice, short and long answer questions. If you have a disability or chronic illness that means you may need special provisions during your examination, you must register with AccessAbility at the start of semester so that these arrangements can be made.
<b>Weighting</b>	40%
<b>Due Date</b>	Formal Examination Period.
<b>Submission Method</b>	Formal Exam
<b>Return Method</b>	Not returned.
<b>Feedback Provided</b>	No feedback.

# ADDITIONAL INFORMATION

## Grading Scheme

This course is graded as follows:

Range of Marks	Grade	Description
85-100	High Distinction (HD)	Outstanding standard indicating comprehensive knowledge and understanding of the relevant materials; demonstration of an outstanding level of academic achievement; mastery of skills*; and achievement of all assessment objectives.
75-84	Distinction (D)	Excellent standard indicating a very high level of knowledge and understanding of the relevant materials; demonstration of a very high level of academic ability; sound development of skills*; and achievement of all assessment objectives.
65-74	Credit (C)	Good standard indicating a high level of knowledge and understanding of the relevant materials; demonstration of a high level of academic achievement; reasonable development of skills*; and achievement of all learning outcomes.
50-64	Pass (P)	Satisfactory standard indicating an adequate knowledge and understanding of the relevant materials; demonstration of an adequate level of academic achievement; satisfactory development of skills*; and achievement of all learning outcomes.
0-49	Fail (FF)	Failure to satisfactorily achieve learning outcomes. If all compulsory course components are not completed the mark will be zero. A fail grade may also be awarded following disciplinary action.

\*Skills are those identified for the purposes of assessment task(s).

## Communication Methods

**Email** is the principal form of communication at the university and within this course. Always use your student email (NUmail), rather than a private email address, and check this regularly. As Course Coordinator I will try to respond to your email within three (3) working days. I will not normally respond to emails over the weekends. Please be courteous in your email communication and in the online space. The University of Newcastle has a [Social Media Communication Guideline](#) that covers all communications in the University for staff and students.

**Canvas** is used to distribute course material, announcements and other information. It is also used for online quizzes and to allow students to track their individual progressive assessment results throughout the semester via Grades. Recordings of the lectures will also be available.

**Discussions:** You can ask questions about minor issues on the Discussion forums. Students are strongly encouraged to use these to communicate with each other, discuss issues relating to the course, and solve minor problems.

## Additional Contact Details

If you have any questions about your course, please speak with your course coordinator, lecturer or tutor first.

For general enquiries, please contact the Pathways and Academic Learning Support Centre Office or your Student Liaison Officer. Additional contacts will be available on your Canvas site.

## Pathways and Academic Learning Support Centre Office

**Callaghan**  
Ground Floor, General Purpose Building (GP)  
Ph: 02 4921 5558  
[enabling@newcastle.edu.au](mailto:enabling@newcastle.edu.au)

**Ourimbah**  
HO 168, Humanities Building  
Ph: 02 4348 4076  
[enabling@newcastle.edu.au](mailto:enabling@newcastle.edu.au)

## Student Liaison Officer

[PALS-SLO@newcastle.edu.au](mailto:PALS-SLO@newcastle.edu.au)

<b>Yapug</b>	<b>Indigenous Enabling Learning Advisor</b> Hannah Pipe Birabahn Building Ph: 02 4921 7952 <a href="mailto:Hannah.Pipe@newcastle.edu.au">Hannah.Pipe@newcastle.edu.au</a>	<b>Program Convenor</b> Dan Collins SAS-217, Birabahn Building Ph: 02 4055 3266 <a href="mailto:Daniel.Collins@newcastle.edu.au">Daniel.Collins@newcastle.edu.au</a>
<b>Attendance and Engagement</b>	<p>In addition to face-to-face hours in class, out-of-class study and related work will require an additional commitment of up to 10 hours per week of reading, preparation, and study time over the semester. Students are required to spend on average 120-140 hours of effort (contact and non-contact including assessment) per semester per 10 unit course.</p> <p>To maximise your learning opportunities, you should read all relevant material prior to attending lectures and tutorials.</p> <p>It is strongly recommended that you attend your lectures and tutorials every week. Our data shows that you will get better results if you attend these classes with your peers. If you do have to miss a class, you should catch up on any missed work by accessing lecture recordings and resources available on your Canvas site. <b>If you cannot attend at least 50% of your tutorials, please contact your Course Coordinator or Student Liaison Officer and discuss the options.</b></p> <p>A plan of regular revision throughout the semester is also strongly recommended to help you manage your time, consolidate information and retain that knowledge for the duration of the course and beyond.</p> <p>Assessment items have been designed to reinforce and revise the course material, and ensure you are up to date with course content. You are required to submit all assessable items by the due dates unless prior arrangements have been made.</p>	
<b>Timetable</b>	Your timetable for this course is available via the myUni Student Portal and can also be found <a href="#">here</a> .	
<b>Software</b>	Free Microsoft Office software is available to enrolled students <a href="#">here</a> and includes 5 TB of free cloud storage with OneDrive.	
<b>Written Assessment Word Limits</b>	Word limits for your written assessments includes headings, sub-heading, in-text citations, quotes and referencing but does not include the list of references, appendices and footnotes. You will not receive a penalty for exceeding the word limit (there is a tolerance of up to 10%), but any work after the maximum word limit may not be included within the allocation of marks.	
<b>Final Examination</b>	<p>This course has a formal examination. All formal examinations will be held during the <a href="#">University's Examination Period</a>. Your <a href="#">exam timetable</a> will be available approximately 4 weeks before the exam period and you must ensure that you are available to undertake your exam at any time during the Examination Period.</p> <p>If you are unable to attend a scheduled examination due to illness or you have another significant, verifiable reason, contact the Pathways and Academic Learning Support Office and advise your lecturer at the earliest opportunity. Completion of an <a href="#">online Adverse Circumstances application</a> including appropriate documentation is required.</p> <p>If you have a permanent or temporary disability or medical condition that means you may need adjustments made during your examination, you must register with <a href="#">AccessAbility</a> at the start of semester so that these arrangements can be made.</p> <p>If you have a Reasonable Adjustment Plan (RAP), your examination will be scheduled in accordance with it. If you are unable to attend your scheduled examination due to illness or other circumstance, you will need to submit an online Adverse Circumstances application and supply appropriate documentation to support your application. Your RAP is not able to be used as your documentation.</p>	

<b>Adverse Circumstances</b>	<p>The University acknowledges the right of students to seek consideration for the impact of allowable adverse circumstances that may affect their performance in assessment item(s).</p> <p>Applications for special consideration due to adverse circumstances will be made using the online Adverse Circumstances system where:</p> <ol style="list-style-type: none"><li>1. the assessment item is a major assessment item; or</li><li>2. the assessment item is a minor assessment item and the Course Co-ordinator has specified in the Course Outline that students may apply the online Adverse Circumstances system;</li><li>3. you are requesting a change of placement; or</li><li>4. the course has a compulsory attendance requirement.</li></ol> <p>Before applying you must refer to the <a href="#">Adverse Circumstances Affecting Assessment Items Procedure</a>.</p> <p>In the Pathways and Academic Learning Support Centre, applications for Adverse Circumstances must be lodged via the online Adverse Circumstances system for all individual assessment items worth 30% or greater.</p>
<b>Oral Interviews (Vivas)</b>	<p>As part of the evaluation process of any assessment item in this course an oral examination (viva) may be conducted. The purpose of the oral examination is to verify the authorship of the material submitted in response to the assessment task. The oral examination will be conducted in accordance with the principles set out in the <a href="#">Oral Examination (viva) Procedure</a>. In cases where the oral examination reveals the assessment item may not be the student's own work the case will be dealt with under the <a href="#">Student Conduct Rule</a>.</p>
<b>Academic Misconduct</b>	<p>All students are required to meet the academic integrity standards of the University. These standards reinforce the importance of integrity and honesty in an academic environment. Academic Integrity policies apply to all students of the University in all modes of study and in all locations. Please refer to the <a href="#">Student Academic Integrity Policy</a>.</p>
<b>Student Support</b>	<p>A wide range of help, advice and support sessions will be available during your studies and emails will be sent throughout the semester as a reminder at key times.</p>
<b>Course Evaluation</b>	<p>Each year feedback is sought from students and other stakeholders about the courses offered in the University for the purposes of identifying areas of excellence and potential improvement.</p>
<b>Important Policy Information</b>	<p>The Help button in the Canvas Navigation menu contains helpful information for using the Learning Management System. Students should familiarise themselves with the <a href="#">policies and procedures</a> that support a safe and respectful environment at the University.</p>
<b>Workplace Health and Safety Requirements</b>	<p>There are no specific WH&amp;S requirements for this course. The lab sessions will be delivered online.</p>

*This course outline was approved by the Director, PALS. No alteration of this course outline is permitted without Director approval. If a change is approved, students will be notified and an amended course outline will be provided in the same manner as the original.*  
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