

COURSE OUTLINE

CHM310 Physical Chemistry

School: School of Science, Technology and Engineering

2026 | Trimester 1

UniSC Sunshine Coast
UniSC Moreton Bay

BLENDED
LEARNING

Most of your course is on campus but you may be able to do some components of this course online.

Please go to usc.edu.au for up to date information on the teaching sessions and campuses where this course is usually offered.

1. What is this course about?

1.1. Description

Producing and analysing quantitative data is central to the problem-solving role of a physical chemist. You produce quantitative data in the laboratory from Bohr's model, calorimetry and catalysis experiments. You analyse quantitative data by rearranging equations, performing dimensional analysis of units, graphing data, differentiating and integrating. Case studies are used to investigate the wave-like properties of all matter and how chemical equilibrium changed the course of history. You also study the three laws of thermodynamics and ideal and real gases.

1.2. How will this course be delivered?

ACTIVITY	HOURS	BEGINNING WEEK	FREQUENCY
BLENDED LEARNING			
Learning materials – One Phys. Chem. topic will be introduced and discussed every week using learning materials pre-recorded.	2hrs	Week 1	12 times
Laboratory 1 – Perform experiments in teams and compare it to physical chemistry literature to write individual reports	3hrs	Week 2	6 times
Tutorial/Workshop 1 – It has two parts: i) group presentations on selected topic relevant to the week topic and ii) discussion on tutorial questions.	2hrs	Week 1	6 times

1.3. Course Topics

1. Electronic structure of atoms including case studies investigating the wave-like properties of all matter
2. Thermochemistry including the First Law of Thermodynamics, enthalpies of reaction and calorimetry
3. Chemical thermodynamics including Second and Third Laws of Thermodynamics and Gibbs Free Energy
4. Gases including real deviations from ideal behaviour
5. Chemical kinetics: the four factors that affect the rate of reaction investigated (including concentration and physical state of reactants, temperature and catalysis)
6. Chemical equilibrium including a case study about how chemical equilibrium change the course of history
7. Phase chemistry including intermolecular forces, enthalpies of physical change and phase diagrams

2. What level is this course?

300 Level (Graduate)

Demonstrating coherence and breadth or depth of knowledge and skills. Independent application of knowledge and skills in unfamiliar contexts. Meeting professional requirements and AQF descriptors for the degree. May require pre-requisites where discipline specific introductory or developing knowledge or skills is necessary. Normally undertaken in the third or fourth full-time study year of an undergraduate program.

3. What is the unit value of this course?

12 units

4. How does this course contribute to my learning?

COURSE LEARNING OUTCOMES	GRADUATE QUALITIES
On successful completion of this course, you should be able to...	Completing these tasks successfully will contribute to you becoming...
1 Apply knowledge of physical chemistry to analyse and solve problems involving quantitative data	Knowledgeable Creative and critical thinker Empowered Ethical Engaged
2 Produce quantitative data and compare the data to physical chemistry literature	Knowledgeable Creative and critical thinker Ethical Engaged
3 Communicate in scientific writing and orally (to peers and staff)	Knowledgeable Creative and critical thinker Empowered Engaged

5. Am I eligible to enrol in this course?

Refer to the [UniSC Glossary of terms](#) for definitions of “pre-requisites, co-requisites and anti-requisites”.

5.1. Pre-requisites

CHM202 or CHM210

5.2. Co-requisites

Not applicable

5.3. Anti-requisites

Not applicable

5.4. Specific assumed prior knowledge and skills (where applicable)

Not applicable

6. How am I going to be assessed?

6.1. Grading Scale

Standard Grading (GRD)

High Distinction (HD), Distinction (DN), Credit (CR), Pass (PS), Fail (FL).

6.2. Details of early feedback on progress

You will have feedbacks on the reports of practical classes and journal article questions during tutorials, with relevance to the final exam.

6.3. Assessment tasks

DELIVERY MODE	TASK NO.	ASSESSMENT PRODUCT	INDIVIDUAL OR GROUP	WEIGHTING %	WHAT IS THE DURATION / LENGTH?	WHEN SHOULD I SUBMIT?	WHERE SHOULD I SUBMIT IT?
All	1	Practical / Laboratory Skills	Individual or Group	60%	<p>Part A (group): Five x 10 min presentations of mathematical application of topic knowledge selected by each group, plus 2 min question time.</p> <p>Part B (individual): Five x 750 word reports of practical application of topic knowledge.</p>	Throughout teaching period (refer to Format)	Online Assignment Submission with plagiarism check and in class
All	2	Quiz/zes	Individual	10%	A quiz of 10 questions related to the key knowledge of each week will be provided on Canvas. Two attempts are allowed. No time limits.	Refer to Format	Online Test (Quiz)
All	3	Examination - Centrally Scheduled	Individual	30%	2 hours (1500 words)	Exam Period	Exam Venue

All - Assessment Task 1: Mathematical and practical application of knowledge of 6 topics - choose your best 5 - or your best 5 marks count

GOAL:	Presentations of quantitative step-wise solutions to physical chemistry problems and produce quantitative data in teams and compare it to physical chemistry literature to write individual reports	
PRODUCT:	Practical / Laboratory Skills	
FORMAT:	<p>Presentation format is demonstration of knowledge of topic and then application of this knowledge to solve a physical chemistry problem. Report format is: title, abstract, introduction, methods, results, discussion, conclusion, references.</p> <p>Part A (group) due: Odd Weeks starting Week 5 Part B (individual) due: Five x 750 word reports of practical application of topic knowledge</p>	
CRITERIA:	No. <ol style="list-style-type: none"> 1 Apply knowledge of physical chemistry to analyse and solve problems involving quantitative data. Produce quantitative data and compare it to physical chemistry literature. Communicate in scientific writing and orally (to peers and staff). 	Learning Outcome assessed 1 2 3
GENERIC SKILLS:	Communication, Collaboration, Problem solving, Organisation, Applying technologies, Information literacy	

All - Assessment Task 2: Quiz

GOAL:	The goal is to better understand the key knowledge of the Week.	
PRODUCT:	Quiz/zes	
FORMAT:	MCQs, or True/False, or SAQs. Submit online prior to the next tutorial.	
CRITERIA:	No. <ol style="list-style-type: none"> 1 The correct use of knowledge learnt to solve physical chemistry questions 2 The correct application of mathematical skills in addressing physical chemistry questions. 	Learning Outcome assessed 1 2
GENERIC SKILLS:	Problem solving, Information literacy	

All - Assessment Task 3: Final exam

GOAL:	Correctly apply physical chemistry knowledge to solve questions in the practical exam.	
PRODUCT:	Examination - Centrally Scheduled	
FORMAT:	Analyse quantitative data using different methods to solve physical chemistry problems based on materials from learning materials, tutorials and laboratory activities.	
CRITERIA:	No. <ol style="list-style-type: none"> 1 Apply knowledge of physical chemistry to analyse and solve problems involving quantitative data. 	Learning Outcome assessed 1 2
GENERIC SKILLS:	Problem solving, Information literacy	

7. Directed study hours

A 12-unit course will have total of 150 learning hours which will include directed study hours (including online if required), self-directed learning and completion of assessable tasks. Student workload is calculated at 12.5 learning hours per one unit.

8. What resources do I need to undertake this course?

Please note: Course information, including specific information of recommended readings, learning activities, resources, weekly readings, etc. are available on the course Canvas site—Please log in as soon as possible.

8.1. Prescribed text(s) or course reader

Please note that you need to have regular access to the resource(s) listed below. Resources may be required or recommended.

REQUIRED?	AUTHOR	YEAR	TITLE	EDITION	PUBLISHER
Required	A. Blackman	2019	Chemistry 4th Edition Hybrid	12th edition	John Wiley & Sons

8.2. Specific requirements

Laboratory coat, safety glasses, closed in footwear.

9. How are risks managed in this course?

Risk assessments have been performed for all laboratory classes and a moderate level of health and safety risk exists. Moderate risks are those associated with laboratory work such as working with chemicals and hazardous substances. You will be required to undertake laboratory induction training and it is also your responsibility to review course material, search online, discuss with lecturers and peers and understand the health and safety risks associated with your specific course of study and to familiarise yourself with the University's general health and safety principles by reviewing the [online induction training for students](#), and following the instructions of the University staff

10. What administrative information is relevant to this course?

10.1. Assessment: Academic Integrity

Academic integrity is the ethical standard of university participation. It ensures that students graduate as a result of proving they are competent in their discipline. This is integral in maintaining the value of academic qualifications. Each industry has expectations and standards of the skills and knowledge within that discipline and these are reflected in assessment.

Academic integrity means that you do not engage in any activity that is considered to be academic fraud; including plagiarism, collusion or outsourcing any part of any assessment item to any other person. You are expected to be honest and ethical by completing all work yourself and indicating in your work which ideas and information were developed by you and which were taken from others. You cannot provide your assessment work to others. You are also expected to provide evidence of wide and critical reading, usually by using appropriate academic references.

In order to minimise incidents of academic fraud, this course may require that some of its assessment tasks, when submitted to Canvas, are electronically checked through Turnitin. This software allows for text comparisons to be made between your submitted assessment item and all other work to which Turnitin has access.

10.2. Assessment: Additional Requirements

Eligibility for Supplementary Assessment

Your eligibility for supplementary assessment in a course is dependent of the following conditions applying:

- (a) The final mark is in the percentage range 47% to 49.4%; and
- (b) The course is graded using the Standard Grading scale

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- The final mark is in the percentage range 47% to 49.4%
- The course is graded using the Standard Grading scale
- You have not failed an assessment task in the course due to academic misconduct

10.3. Assessment: Submission penalties

Late submissions may be penalised up to and including the following maximum percentage of the assessment task's identified value, with weekdays and weekends included in the calculation of days late:

- (a) One day: deduct 5%;
- (b) Two days: deduct 10%;
- (c) Three days: deduct 20%;
- (d) Four days: deduct 40%;
- (e) Five days: deduct 60%;
- (f) Six days: deduct 80%;
- (g) Seven days: A result of zero is awarded for the assessment task.

The following penalties will apply for a late submission for an online examination:

Less than 15 minutes: No penalty

From 15 minutes to 30 minutes: 20% penalty

More than 30 minutes: 100% penalty

10.4. SafeUniSC

UniSC is committed to a culture of respect and providing a safe and supportive environment for all members of our community. For immediate assistance on campus contact SafeUniSC by phone: [07 5430 1168](tel:0754301168) or using the [SafeZone](#) app. For general enquires contact the SafeUniSC team by phone [07 5456 3864](tel:0754563864) or email safe@usc.edu.au.

The SafeUniSC Specialist Service is a Student Wellbeing service that provides free and confidential support to students who may have experienced or observed behaviour that could cause fear, offence or trauma. To contact the service call [07 5430 1226](tel:0754301226) or email studentwellbeing@usc.edu.au.

10.5. Study help

For help with course-specific advice, for example what information to include in your assessment, you should first contact your tutor, then your course coordinator, if needed.

If you require additional assistance, the Learning Advisers are trained professionals who are ready to help you develop a wide range of academic skills. Visit the [Learning Advisers](#) web page for more information, or contact Student Central for further assistance: +61 7 5430 2890 or studentcentral@usc.edu.au.

10.6. Wellbeing Services

Student Wellbeing provide free and confidential counselling on a wide range of personal, academic, social and psychological matters, to foster positive mental health and wellbeing for your academic success.

To book a confidential appointment go to [Student Hub](#), email studentwellbeing@usc.edu.au or call 07 5430 1226.

10.7. AccessAbility Services

Ability Advisers ensure equal access to all aspects of university life. If your studies are affected by a disability, learning disorder mental health issue, injury or illness, or you are a primary carer for someone with a disability or who is considered frail and aged, [AccessAbility Services](#) can provide access to appropriate reasonable adjustments and practical advice about the support and facilities available to you throughout the University.

To book a confidential appointment go to [Student Hub](#), email AccessAbility@usc.edu.au or call 07 5430 2890.

10.8. Links to relevant University policy and procedures

For more information on Academic Learning & Teaching categories including:

- Assessment: Courses and Coursework Programs
- Review of Assessment and Final Grades
- Supplementary Assessment
- Central Examinations
- Deferred Examinations
- Student Conduct
- Students with a Disability

For more information, visit <https://www.usc.edu.au/explore/policies-and-procedures#academic-learning-and-teaching>

10.9. Student Charter

UniSC is committed to excellence in teaching, research and engagement in an environment that is inclusive, inspiring, safe and respectful. The [Student Charter](#) sets out what students can expect from the University, and what in turn is expected of students, to achieve these outcomes.

10.10.General Enquiries

In person:

- **UniSC Sunshine Coast** - Student Central, Ground Floor, Building C, 90 Sippy Downs Drive, Sippy Downs
- **UniSC Moreton Bay** - Service Centre, Ground Floor, Foundation Building, Gympie Road, Petrie
- **UniSC SouthBank** - Student Central, Building A4 (SW1), 52 Merivale Street, South Brisbane
- **UniSC Gympie** - Student Central, 71 Cartwright Road, Gympie
- **UniSC Fraser Coast** - Student Central, Student Central, Building A, 161 Old Maryborough Rd, Hervey Bay
- **UniSC Caboolture** - Student Central, Level 1 Building J, Cnr Manley and Tallon Street, Caboolture

Tel: +61 7 5430 2890

Email: studentcentral@usc.edu.au