



COURSE OUTLINE

CHM310 Physical Chemistry

Course Coordinator: Tianfang Wang (twang@usc.edu.au) **School:** School of Science, Technology and Engineering

2021 | Semester 1

USC Sunshine Coast
USC Moreton Bay

ON CAMPUS

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

Please go to the USC website 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
ON CAMPUS			
Lecture – One Phys. Chem. topic will be introduced and discussed every two weeks.	2hrs	Week 1	13 times
Tutorial/Workshop – It has two parts: i) group presentations on selected topic relevant to the week topic and ii) discussion on tutorial questions.	2hrs	Week 3	6 times
Laboratory – Perform experiments in teams and compare it to physical chemistry literature to write individual reports	3hrs	Week 2	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 [USC Glossary of terms](#) for definitions of “pre-requisites, co-requisites and anti-requisites”.

5.1. Pre-requisites

SCI105

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 and Group	50%	Part A (group): Five x 10 min presentations of mathematical application of topic knowledge selected by each group, plus 2 min question time. Part B (individual): Five x 500 word reports of practical application of topic knowledge.	Throughout teaching period (refer to Format)	Online Assignment Submission with plagiarism check and in class
All	2	Examination - Centrally Scheduled	Individual	50%	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:	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. Part A (group) due: Odd Weeks starting Week 5 Part B (individual) due: Five x 500 word reports of practical application of topic knowledge	
CRITERIA:	No.	Learning Outcome assessed
	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).
	2	Assessment criteria are mapped to the course learning outcomes. 1 2 3

All - Assessment Task 2: Final exam

GOAL:	
PRODUCT:	Examination - Centrally Scheduled
FORMAT:	Analyse quantitative data using different methods to solve physical chemistry problems based on materials from lectures, tutorials and laboratory activities.

CRITERIA:**No.****Learning Outcome
assessed**

1	Apply knowledge of physical chemistry to analyse and solve problems involving quantitative data.	
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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. Directed study hours may vary by location. 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 Blackboard 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	PUBLISHER
Required	Brown, LeMay, Bursten, Murphy & Woodward	2011	Chemistry: The central science	Pearson Education Inc.

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 Blackboard, are electronically checked through SafeAssign. This software allows for text comparisons to be made between your submitted assessment item and all other work that SafeAssign has access to.

10.2. Assessment: Additional Requirements

Eligibility for Supplementary Assessment

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

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 submission of assessment tasks may be penalised at the following maximum rate:

- 5% (of the assessment task's identified value) per day for the first two days from the date identified as the due date for the assessment task.
- 10% (of the assessment task's identified value) for the third day - 20% (of the assessment task's identified value) for the fourth day and subsequent days up to and including seven days from the date identified as the due date for the assessment task.
- A result of zero is awarded for an assessment task submitted after seven days from the date identified as the due date for the assessment task. Weekdays and weekends are included in the calculation of days late. To request an extension you must contact your course coordinator to negotiate an outcome.

10.4. 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.

10.5. 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.

10.6. 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.

10.7. 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
- Administration of Central Examinations
- Deferred Examinations
- Student Academic Misconduct
- Students with a Disability

Visit the USC website: <http://www.usc.edu.au/explore/policies-and-procedures#academic-learning-and-teaching>

10.8. General Enquiries

In person:

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

Tel: +61 7 5430 2890

Email: studentcentral@usc.edu.au