Course Outline

Code: SCI105
Title: Chemistry

School: Science & Engineering
Teaching Session: Semester 2
Year: 2019
Course Coordinator: Dr David McKay Email: dmckay@usc.edu.au
Course Moderator: Dr Peter Brooks Email: pbrooks@usc.edu.au

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
This course provides the cross disciplinary chemical concepts essential for science, engineering and education. You study atomic theory, the Periodic Table, chemical bonding and reactions, electrochemistry, fundamentals of chemical thermodynamics including a general introduction to chemical equilibria, reaction kinetics, and the properties of gases, liquids and solutions. The course also explains the properties of acids and bases, the concept of pH, and the buffer systems. An introduction to organic chemistry is provided. You work in teams in the laboratory to investigate chemical concepts.

1.2 Field trips, WIL placements or activities required by professional accreditation

<table>
<thead>
<tr>
<th>Activity</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not applicable</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

2. What level is this course?

100 level Introductory - Discipline knowledge and skills at foundational level, broad application of knowledge and skills in familiar contexts and with support. Normally associated with the first full-time 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?

<table>
<thead>
<tr>
<th>Specific Learning Outcomes</th>
<th>Assessment tasks</th>
<th>Graduate Qualities or Professional Standards mapping</th>
</tr>
</thead>
<tbody>
<tr>
<td>On successful completion of this course, you should be able to:</td>
<td>You will be assessed on the learning outcomes in task/s:</td>
<td>Completing these tasks successfully will contribute to:</td>
</tr>
<tr>
<td>Demonstrate theoretical knowledge of chemical principles, structure, properties, processes (biological and environmental) and units of measurements</td>
<td>Mid Semester Exam Practical Report Practical Quizzes Final Exam</td>
<td>Knowledgeable</td>
</tr>
<tr>
<td>Observe, interpret and evaluate chemical reactions</td>
<td>Mid-semester Exam Practical Report Practical Quizzes Final Examination</td>
<td>Creative and critical thinkers. Empowered.</td>
</tr>
<tr>
<td>Solve problems using mathematical calculations and manipulations and report answers to the correct significant figures</td>
<td>Mid Semester Exam Practical Report Practical Quizzes Final Exam</td>
<td>Knowledgeable. Empowered.</td>
</tr>
<tr>
<td>Communicate the outcomes of a practical by writing a scientific report.</td>
<td>Practical Report</td>
<td>Knowledgeable. Empowered.</td>
</tr>
</tbody>
</table>

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 Enrolment restrictions
Nil

5.2 Pre-requisites
Nil

5.3 Co-requisites
Nil

5.4 Anti-requisites
SCI505

5.5 Specific assumed prior knowledge and skills (where applicable)
Not Applicable

6. How am I going to be assessed?

6.1 Grading scale
Standard – High Distinction (HD), Distinction (DN), Credit (CR), Pass (PS), Fail (FL)

6.2 Details of early feedback on progress
Early and continuing feedback on your progress in the course is provided using each week's on-line questions supplied in Learning Materials in Blackboard. The mid-semester and final exams will be based very heavily on these questions. The on-line questions will help a lot with you seeing what is important in the course. Finally, please be very mindful of how you are using the on-line questions to study: This is NOT a game of “learning” the right answers to questions. You should ask yourself, “Do I really understand why a particular answer is correct?” and “Can I write an explanation about why a particular answer is correct?”.
## Assessment tasks

<table>
<thead>
<tr>
<th>Task No.</th>
<th>Assessment Product</th>
<th>Individual or Group</th>
<th>Weighting %</th>
<th>What is the duration/length?</th>
<th>When should I submit?</th>
<th>Where should I submit it?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Examination</td>
<td>Individual</td>
<td>25%</td>
<td>60 minutes</td>
<td>Week 6 Tutorial</td>
<td>In Class</td>
</tr>
<tr>
<td>2</td>
<td>Quiz/zes</td>
<td>Individual</td>
<td>15%</td>
<td>5-10 minutes each</td>
<td>Practical On-line Quizzes are submitted during scheduled practical sessions.</td>
<td>Quiz (Online Test)</td>
</tr>
<tr>
<td>3</td>
<td>Report</td>
<td>Individual</td>
<td>20%</td>
<td>One practical report, 1000-2000 words. See Blackboard for details.</td>
<td>Friday Week 13</td>
<td>Online Assignment Submission with Plagiarism check</td>
</tr>
<tr>
<td>4</td>
<td>Examination</td>
<td>Individual</td>
<td>40%</td>
<td>2 hours</td>
<td>Central Exam Period</td>
<td>Exam Venue</td>
</tr>
</tbody>
</table>

### Assessment Task 1: Mid-Semester Exam

**Goal:** This mid-semester assessment requires you to apply your conceptual knowledge of chemical principles and use your problem-solving abilities.

**Product:** Examination

**Format:** 60 minutes, 25 question multiple choice exam

**Criteria:** Apply theoretical knowledge of chemical principles, structure, properties and units of measurement; interpret and evaluate chemical reactions.

### Assessment Task 2: Practical Quizzes

**Goal:** Demonstrate knowledge of theory underpinning laboratory chemistry

**Product:** Quiz/zes

**Format:** Students will complete 6 on-line quizzes (10 min. each) based on practical work.

**Criteria:** Calculations and knowledge of theories underpinning the laboratory work.

### Assessment Task 3: Practical Report

**Goal:** From your notes and observations, gathered as you work in the laboratory sessions, you demonstrate your ability to communicate your ideas in a written practical report.

**Product:** Report

**Format:** You build throughout the semester to writing a scientific report. Further guidance about what is required, is available in the assessment section of Blackboard.

**Criteria:** Observe, interpret, evaluate and report mathematical calculations and chemical reactions.

### Assessment Task 4: Final examination

**Goal:** You will demonstrate your ability to solve problems, demonstrate knowledge and interpret and evaluate chemical reactions.

**Product:** Examination

**Format:** Multiple choice, short and extended answer exam based on materials from lectures, tutorials and laboratory activities.

**Criteria:** Solve problems using mathematical calculations and manipulations and report answers to the correct significant figures; demonstrate theoretical knowledge of chemical principles, structure, properties, processes (biological and environmental) and units of measurement; interpret and evaluate chemical reactions.
7. What are the course activities?

7.1 Directed study hours

The directed study hours listed here are a portion of the workload for this course. 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.

<table>
<thead>
<tr>
<th>Location: Specific Campus(es) or online:</th>
<th>Directed study hours for location:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sippy Downs</td>
<td>2 hour lecture/week; 2 hour tutorial/week; 6 x 3 hour compulsory practical sessions (see timetable and Blackboard for details).</td>
</tr>
<tr>
<td>Fraser Coast (sem 2)</td>
<td>2 hour lecture/week; 2 hour tutorial/week; 6 x 3 hour compulsory practical sessions (see timetable and Blackboard for details).</td>
</tr>
</tbody>
</table>

7.2 Course content

Chapter numbers refer to the reference textbook (see Section 8 below for details).

<table>
<thead>
<tr>
<th>TOPIC # (Indicative sequencing only: see Blackboard for each week’s details)</th>
<th>What key concepts/content will I learn?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/ Chapter 1 Essential Ideas</td>
<td>Phases and classification of matter; Physical and chemical properties; Measurement.</td>
</tr>
<tr>
<td>2/ Chapter 2: Atoms, molecules and Ions</td>
<td>Early ideas in atomic theory; formulas; periodic table; molecular and ionic compounds; nomenclature.</td>
</tr>
<tr>
<td>3/ Chapter 2: Atoms, molecules and Ions...continued</td>
<td>Early ideas in atomic theory; formulas; periodic table; molecular and ionic compounds; nomenclature.</td>
</tr>
<tr>
<td>4/ Chapter 3: Composition of substances and solutions</td>
<td>Formula mass; moles; molarity; concentration.</td>
</tr>
<tr>
<td>5/ Chapter 4: Stoichiometry of chemical reactions</td>
<td>Writing, balancing and classifying chemical reactions; stoichiometry.</td>
</tr>
<tr>
<td>6/Chapter 12: Kinetics Chapter 13: Fundamental equilibrium concepts</td>
<td>Factors affecting reaction rates; collision theory; catalysis. Equilibria and equilibrium concepts; Le Chatelier’s Principle, equilibrium calculations.</td>
</tr>
<tr>
<td>7/ Chapter 14: Acid-base equilibria</td>
<td>Definitions; pH and pOH; strengths of acids and bases; buffers; titrations.</td>
</tr>
<tr>
<td>8/ Chapter 6: Electronic structure and periodicity</td>
<td>Electromagnetic energy, quantum theory; electronic structure; periodicity.</td>
</tr>
<tr>
<td>9/ Chapter 7: Chemical bonding and molecular geometry</td>
<td>Ionic and covalent bonding; Lewis symbols; resonance; structure and polarity</td>
</tr>
<tr>
<td>10/ Chapter 9: Gases</td>
<td>Ideal gas theory and equations; stoichiometry; kinetic theory of gases; non-ideal gases. Intermolecular forces; properties of liquids.</td>
</tr>
<tr>
<td>Chapter 10: Liquids and solids</td>
<td></td>
</tr>
<tr>
<td>11/ Chapter 17: Electrochemistry</td>
<td>Definition of a redox reaction; half reactions; standard reduction potentials. NOTE: this is a very small module! Nomenclature and functional groups.</td>
</tr>
<tr>
<td>Chapter 20: Organic Chemistry</td>
<td></td>
</tr>
<tr>
<td>12/ Chapter 20 Organic Chemistry continued</td>
<td></td>
</tr>
<tr>
<td>13/ Chapter 5: Thermochemistry</td>
<td>Energy; calorimetry; enthalpy.</td>
</tr>
</tbody>
</table>
8. What resources do I need to undertake this course?
Please note that 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 as they are required:

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Title</th>
<th>Publisher</th>
</tr>
</thead>
</table>

**Please note:** This textbook is for reference only, helping to scaffold the topics covered in this course. You should not rely on just one textbook as your source of information. Other sources of information, including other textbooks and websites, are listed in Blackboard.

8.2 Specific requirements
This course relies heavily on the use of USC’s learning management system called “Blackboard”. You will need to access course materials using a device and system that you feel comfortable with. It may take you a little time to figure out what will work best for you. You should attend all laboratory sessions. To do so, you must complete the laboratory induction process via Blackboard. You must attend all laboratory sessions with safety glasses, lab coat and covered footwear. See Blackboard (this course) for more details.

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, such as working with chemicals and hazardous substances. You will be required to undertake laboratory induction training.
It is your responsibility as a student 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. It is also your responsibility to familiarise yourself with the University’s general health and safety principles by reviewing the [online Health Safety and Wellbeing training module 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 on the following conditions applying:

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

10.3 **Assessment: Submission penalties**

Late submission of assessment tasks will 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 and supply the required documentation to negotiate an outcome.

10.4 **Study help**

In the first instance, you should contact your tutor, then the Course Coordinator. Additional assistance is provided to all students through Academic Skills Advisers. To book an appointment or find a drop-in session go to [Student Hub](#).

Contact Student Central for further assistance: +61 7 5430 2890 or [studentcentral@usc.edu.au](mailto:studentcentral@usc.edu.au)

10.5 **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


10.6 **General Enquiries**

In person:

- **USC Sunshine Coast** - Student Central, Ground Floor, Building C, 90 Sippy Downs Drive, Sippy Downs
- **USC South Bank** - 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](mailto:studentcentral@usc.edu.au)