



CHEM13081 *Biomaterials: Environmental and Medical Applications*

Term 2 - 2020

Profile information current as at 20/04/2024 02:17 pm

All details in this unit profile for CHEM13081 have been officially approved by CQUniversity and represent a learning partnership between the University and you (our student). The information will not be changed unless absolutely necessary and any change will be clearly indicated by an approved correction included in the profile.

General Information

Overview

This unit is an introduction to the use and usefulness of biomaterials. You will be introduced to the materials science of metals, ceramics, polymers and composites, and the engineering principles behind biomaterial design. You will also discuss the medical and environmental applications of biomaterials, such as biomedical engineering, bioactive polymers and antifouling biofilms.

Details

Career Level: *Undergraduate*

Unit Level: *Level 3*

Credit Points: 6

Student Contribution Band: 8

Fraction of Full-Time Student Load: 0.125

Pre-requisites or Co-requisites

Prerequisite: CHEM11041 Chemistry for the Life Sciences or CHEM11043 Atoms, Molecules and Matter or CHEM11044 Chemical Reactions

Important note: Students enrolled in a subsequent unit who failed their pre-requisite unit, should drop the subsequent unit before the census date or within 10 working days of Fail grade notification. Students who do not drop the unit in this timeframe cannot later drop the unit without academic and financial liability. See details in the [Assessment Policy and Procedure \(Higher Education Coursework\)](#).

Offerings For Term 2 - 2020

- Mixed Mode
- Rockhampton

Attendance Requirements

All on-campus students are expected to attend scheduled classes - in some units, these classes are identified as a mandatory (pass/fail) component and attendance is compulsory. International students, on a student visa, must maintain a full time study load and meet both attendance and academic progress requirements in each study period (satisfactory attendance for International students is defined as maintaining at least an 80% attendance record).

Residential Schools

This unit has a Compulsory Residential School for distance mode students and the details are:

Click here to see your [Residential School Timetable](#).

Website

[This unit has a website, within the Moodle system, which is available two weeks before the start of term. It is important that you visit your Moodle site throughout the term. Please visit Moodle for more information.](#)

Class and Assessment Overview

Recommended Student Time Commitment

Each 6-credit Undergraduate unit at CQUniversity requires an overall time commitment of an average of 12.5 hours of study per week, making a total of 150 hours for the unit.

Class Timetable

[Regional Campuses](#)

Bundaberg, Cairns, Emerald, Gladstone, Mackay, Rockhampton, Townsville

[Metropolitan Campuses](#)

Adelaide, Brisbane, Melbourne, Perth, Sydney

Assessment Overview

1. **Research Proposal**

Weighting: 15%

2. **Research Assignment**

Weighting: 35%

3. **Take Home Exam**

Weighting: 50%

Assessment Grading

This is a graded unit: your overall grade will be calculated from the marks or grades for each assessment task, based on the relative weightings shown in the table above. You must obtain an overall mark for the unit of at least 50%, or an overall grade of 'pass' in order to pass the unit. If any 'pass/fail' tasks are shown in the table above they must also be completed successfully ('pass' grade). You must also meet any minimum mark requirements specified for a particular assessment task, as detailed in the 'assessment task' section (note that in some instances, the minimum mark for a task may be greater than 50%). Consult the [University's Grades and Results Policy](#) for more details of interim results and final grades.

CQUniversity Policies

All University policies are available on the [CQUniversity Policy site](#).

You may wish to view these policies:

- Grades and Results Policy
- Assessment Policy and Procedure (Higher Education Coursework)
- Review of Grade Procedure
- Student Academic Integrity Policy and Procedure
- Monitoring Academic Progress (MAP) Policy and Procedure – Domestic Students
- Monitoring Academic Progress (MAP) Policy and Procedure – International Students
- Student Refund and Credit Balance Policy and Procedure
- Student Feedback – Compliments and Complaints Policy and Procedure
- Information and Communications Technology Acceptable Use Policy and Procedure

This list is not an exhaustive list of all University policies. The full list of University policies are available on the [CQUniversity Policy site](#).

Previous Student Feedback

Feedback, Recommendations and Responses

Every unit is reviewed for enhancement each year. At the most recent review, the following staff and student feedback items were identified and recommendations were made.

Feedback from Have Your Say

Feedback

The video lectures should be in downloadable form to allow for access as required, or when the Internet is not available.

Recommendation

We will work with ITS to ensure the videos are uploaded in downloadable form.

Feedback from Have Your Say

Feedback

The students found the content to be rather heavy and a lot to go through.

Recommendation

We will revisit the content and identify if there are sections that can be made simpler.

Unit Learning Outcomes

On successful completion of this unit, you will be able to:

1. Describe the various types of biomaterials and the principles of biomaterial design and development
2. Discuss strategies to solve significant problems in health and the environment using the principles of biomaterial science
3. Evaluate the use of biomaterials and devices constructed with biomaterials
4. Assess the compatibility of biomaterials in health and environmental disciplines and apply the appropriate compatibility requirements to real world applications.

Potential RACI accreditation of the unit - currently in discussion with the RACI.

Alignment of Learning Outcomes, Assessment and Graduate Attributes



Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes			
	1	2	3	4
1 - Research Proposal - 15%	•	•		
2 - Research Assignment - 35%		•	•	•
3 - Take Home Exam - 50%	•		•	•

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes			
	1	2	3	4
1 - Communication	•			
2 - Problem Solving		•	•	•
3 - Critical Thinking	•	•	•	•
4 - Information Literacy	•			
5 - Team Work				
6 - Information Technology Competence				
7 - Cross Cultural Competence		•		
8 - Ethical practice			•	
9 - Social Innovation				
10 - Aboriginal and Torres Strait Islander Cultures				

Alignment of Assessment Tasks to Graduate Attributes

Assessment Tasks	Graduate Attributes									
	1	2	3	4	5	6	7	8	9	10
1 - Research Proposal - 15%	•	•					•	•		
2 - Take Home Exam - 50%	•	•	•							

Textbooks and Resources

Textbooks

CHEM13081

Prescribed

Introduction to Biomaterials

Edition: 2 (2011)

Authors: Jeffrey O. Hollinger (Editor)

CRC Press

Binding: eBook

Additional Textbook Information

If you prefer to study with a paper copy, they are available at the CQUni Bookshop here: <http://bookshop.cqu.edu.au> (search on the Unit code). eBooks are available at the publisher's website.

IT Resources

You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)

Referencing Style

All submissions for this unit must use the referencing style: [Vancouver](#)
For further information, see the Assessment Tasks.

Teaching Contacts

Shaneel Chandra Unit Coordinator

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Ty Jones Unit Coordinator

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Schedule

Week 1 - 13 Jul 2020

Module/Topic	Chapter	Events and Submissions/Topic
Introduction to Biomaterials - History - Potential		From groups for assessments

Week 2 - 20 Jul 2020

Module/Topic	Chapter	Events and Submissions/Topic
Biomaterials Surfaces: Physics - Surface properties and cell adhesion		Students should be preparing for Assessment 1: Finalise research topics; prepare a research proposal.

Week 3 - 27 Jul 2020

Module/Topic	Chapter	Events and Submissions/Topic
Biomaterials Surfaces: Chemistry - Chemisorption on metals and oxides - Aqueous corrosion of metals - Polymer		

Week 4 - 03 Aug 2020

Module/Topic	Chapter	Events and Submissions/Topic
Biomaterials Surfaces: Bio-chemistry - Protein interaction - Cell-surface interaction		Ensure your complete list of consumables (chemicals), glassware (with size and number required), and instrumentation required for the investigative experiment associated with assessment 1.

Week 5 - 10 Aug 2020

Module/Topic	Chapter	Events and Submissions/Topic
Surface modification of Biomaterials		Submit assessment 1 - Research Proposal Research Proposal Due: Week 5 Friday (14 Aug 2020) 11:55 pm AEST

Vacation Week - 17 Aug 2020

Module/Topic	Chapter	Events and Submissions/Topic
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Week 6 - 24 Aug 2020

Module/Topic	Chapter	Events and Submissions/Topic
Biomaterials and Nanomaterials		

Week 7 - 31 Aug 2020

Module/Topic	Chapter	Events and Submissions/Topic
Systematic Research Experimental Review		Students should be doing their assessment 2 - Systematic Research Experimental Review to replace residential school lab work.

Week 8 - 07 Sep 2020

Module/Topic	Chapter	Events and Submissions/Topic
Biosensors		

Week 9 - 14 Sep 2020

Module/Topic	Chapter	Events and Submissions/Topic
Biomaterials for medical applications - Drug Delivery		Submit assessment 2 - Part A

Week 10 - 21 Sep 2020

Module/Topic	Chapter	Events and Submissions/Topic
Biomaterials for medical applications - Tissue generation		Submit assessment 2 - Part B Research Experimental Outcomes Due: Week 10 Friday (25 Sept 2020) 11:55 pm AEST

Week 11 - 28 Sep 2020

Module/Topic	Chapter	Events and Submissions/Topic
Biomaterials for medical applications - Medical devices.		Submit Assessment 2 - Part C- Research PowerPoint Outcomes Presentation and present their work in front of academic staff panel and classmates online.

Week 12 - 05 Oct 2020

Module/Topic	Chapter	Events and Submissions/Topic
Biomaterials for environmental applications		

Review/Exam Week - 12 Oct 2020

Module/Topic	Chapter	Events and Submissions/Topic
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Exam Week - 19 Oct 2020

Module/Topic	Chapter	Events and Submissions/Topic
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Term Specific Information

Due to COVID-19 impacts at the time of preparing this unit profile, the residential school attached to this unit for Term 2 2020 has been cancelled.

The invigilated exam has been replaced with a Take-Home Assessment/Exam.

Assessment Tasks

1 Research Proposal

Assessment Type

Research Proposal

Task Description

Advanced scientific projects and research are invariably subject to much scrutiny. Other scientists in the field will be looking at your work and will expect that the data has been rigorously analysed. Rigorous analysis requires careful experimental design.

Prior to undertaking research, you need to consider and anticipate the types of observations you'll be making, the likely outcomes, and how you can evaluate your data to differentiate statistically between outcomes. Failure to do so will most likely result in the experiment(s) not providing informative data, which is poor science and a waste of resources.

In this assessment, you will work in groups (self-allocated via the choice of topic, in week 2) to design an experiment(s) to address a biomaterial related challenge. The challenge topics should be relevant to the Australian context. This task should be completed by 24/7/2020. You will then prepare an investigative/experimental proposal and conduct a Systematic Review and Meta-analysis for your research experimental proposal in Assessment 2. I attached a PDF presentation slides and a recorded MP4 about research Systematic Review and Meta-analysis for your perusal.

The first step to this inquiry-based practical is to select one of the biomaterial related challenges identified that can be evaluated through measurement.

The second step is to list all the equipment and resources proposed for the exercise.

The proposal should contain the typical elements of scientific writing including:

- brief background to the issue,
- presentation the of research idea,
- scientific methodology and approach to investigating the problem,
- anticipated outcomes/findings and
- potential impact

Assessment Due Date

Week 5 Friday (14 Aug 2020) 11:55 pm AEST

Submissions via the Moodle site for CHEM13081 and must be in MS Word format

Return Date to Students

Week 7 Friday (4 Sept 2020)

Two weeks after submission with feedback via Moodle.

Weighting

15%

Assessment Criteria

General Guidelines

- The proposal should be coherent, have flow and there should be no typographical errors.
- Text should be word-processed, with appropriate layout and use of headings/sub-headings.
- Tables and figures to illustrate specific aspects may be included with titles and acknowledgment where

- necessary.
- Figures and tables should be correctly labelled.
- All material sourced externally must be cited in the correct format (APA). For more information about APA reference, please visit <https://www.cqu.edu.au/student-life/services-and-facilities/referencing/cquniversity-referencing-guides>
- The references should be listed at the end of the assessment.
- Please avoid images with very large file sizes as this will make your proposal too large to upload/download.

All submissions must be typed and should be made in electronic format, and be submitted through the assessment link in Moodle, by uploading your file following the on-screen instructions. You must submit the assessment by uploading word document(s) (i.e. .doc or .docx), through the Moodle site. Mac users should ensure that the file name has '.doc' or '.docx' for word files.

This will ensure that you are able to upload into Moodle. The assessment task must be completed and submitted by the due date and time. In the absence of an approved extension, there will be no opportunity to complete the task after this date and there will be no supplementary exam or assessment offered should you come close to passing the unit but do not meet the criteria for a Pass grade for the overall unit.

Referencing Style

- [Vancouver](#)

Submission

Online Group

Submission Instructions

A member of each group submits your group Research Proposal on the Moodle site for CHEM13081

Learning Outcomes Assessed

- Describe the various types of biomaterials and the principles of biomaterial design and development
- Discuss strategies to solve significant problems in health and the environment using the principles of biomaterial science

Graduate Attributes

- Communication
- Problem Solving
- Cross Cultural Competence
- Ethical practice

2 Research Experimental Outcomes

Assessment Type

Research Assignment

Task Description

Assessment 2 follows your assessment 1 - Research Proposal. This assessment has three parts:

- Part A (15%): Research Experimental Outcomes
- Part B (15%): Write a Biomaterial Science Article
- Part C (5%): Research PowerPoint Outcomes Presentation

Research Experimental Outcomes (applying Systematic Review and Meta-analysis, no residential school and experiments will be conducted).

Students will report the findings from their investigative exercise (assessment 1) in the form of a scientific manuscript. The manuscript should be in the format of either the journal Biomaterials Science or the Journal of Chemical education. The formatting and author guidelines can be found on the individual journal's websites. Adherence to these guidelines is a part of the Assessment Criteria for this exercise.

Please Note: This is a group submission.

Assessment Due Date

Week 10 Friday (25 Sept 2020) 11:55 pm AEST

Submissions via the Moodle site for CHEM13081 and must be in MS Word format

Return Date to Students

Week 12 Friday (9 Oct 2020)

Two weeks after submission with feedback via the unit Moodle - CHEM13081 site

Weighting

35%

Assessment Criteria

Apply the following criteria:

- The manuscript should be coherent, have flow and all material sourced externally must be cited in the correct format.
- Text should be word-processed, with appropriate layout and use of headings/sub-headings. Tables and figures to illustrate specific aspects may be included with titles and acknowledgment where necessary.
- Please avoid images with very large file sizes as this will make your manuscript too large to upload/download.
- Data should be clearly presented, e.g. numerical data must be tabulated.
- Figures and tables should be correctly labelled.
- There should be no typographical error.

Marking Criteria:

- Abstract (5 %)
- Literature review (25 %)
- Results presentation and analysis (20 %)
- Discussion (30 %)
- Conclusion (10 %)
- Presentation adherence to Biomaterials Science guidelines or Journal of Chemical Education (10 %)

Referencing Style

- [Vancouver](#)

Submission

Online Group

Submission Instructions

A member of each group submits your group Research Proposal on the Moodle site for CHEM13081

Learning Outcomes Assessed

- Discuss strategies to solve significant problems in health and the environment using the principles of biomaterial science
- Evaluate the use of biomaterials and devices constructed with biomaterials
- Assess the compatibility of biomaterials in health and environmental disciplines and apply the appropriate compatibility requirements to real world applications.

3 Take Home Assessment/Exam

Assessment Type

Take Home Exam

Task Description

The alternative assessment will be a written assessment/take-home exam that will cover the content you have studied during this term. This assessment is designed to assess your comprehension of the concepts presented in the unit through their application to answer a series of questions.

Assessment Due Date

Take-Home assessment - Date and time to be advised on Moodle.

Return Date to Students

Return Take-Home assessment to students two weeks after submission with feedback via the unit Moodle - CHEM13081 site

Weighting

50%

Minimum mark or grade

40%

Assessment Criteria

Marks will be awarded for each question as indicated in the assessment item. All submissions should be typed and saved as a word document.

Referencing Style

- [Vancouver](#)

Submission

Online

Submission Instructions

Submissions must be in MS Word format on the unit Moodle - CHEM13081 Site

Learning Outcomes Assessed

- Describe the various types of biomaterials and the principles of biomaterial design and development
- Evaluate the use of biomaterials and devices constructed with biomaterials
- Assess the compatibility of biomaterials in health and environmental disciplines and apply the appropriate compatibility requirements to real world applications.

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking

Academic Integrity Statement

As a CQUniversity student you are expected to act honestly in all aspects of your academic work.

Any assessable work undertaken or submitted for review or assessment must be your own work. Assessable work is any type of work you do to meet the assessment requirements in the unit, including draft work submitted for review and feedback and final work to be assessed.

When you use the ideas, words or data of others in your assessment, you must thoroughly and clearly acknowledge the source of this information by using the correct referencing style for your unit. Using others' work without proper acknowledgement may be considered a form of intellectual dishonesty.

Participating honestly, respectfully, responsibly, and fairly in your university study ensures the CQUniversity qualification you earn will be valued as a true indication of your individual academic achievement and will continue to receive the respect and recognition it deserves.

As a student, you are responsible for reading and following CQUniversity's policies, including the [Student Academic Integrity Policy and Procedure](#). This policy sets out CQUniversity's expectations of you to act with integrity, examples of academic integrity breaches to avoid, the processes used to address alleged breaches of academic integrity, and potential penalties.

What is a breach of academic integrity?

A breach of academic integrity includes but is not limited to plagiarism, self-plagiarism, collusion, cheating, contract cheating, and academic misconduct. The Student Academic Integrity Policy and Procedure defines what these terms mean and gives examples.

Why is academic integrity important?

A breach of academic integrity may result in one or more penalties, including suspension or even expulsion from the University. It can also have negative implications for student visas and future enrolment at CQUniversity or elsewhere. Students who engage in contract cheating also risk being blackmailed by contract cheating services.

Where can I get assistance?

For academic advice and guidance, the [Academic Learning Centre \(ALC\)](#) can support you in becoming confident in completing assessments with integrity and of high standard.

What can you do to act with integrity?



Be Honest

If your assessment task is done by someone else, it would be dishonest of you to claim it as your own



Seek Help

If you are not sure about how to cite or reference in essays, reports etc, then seek help from your lecturer, the library or the Academic Learning Centre (ALC)



Produce Original Work

Originality comes from your ability to read widely, think critically, and apply your gained knowledge to address a question or problem