UNSW Course Outline

BIOM9310 Biomaterials and Cell Technologies - 2025

Published on the 13 Feb 2025

General Course Information

Course Code : BIOM9310
Year : 2025
Term : Term 1
Teaching Period : T1
Is a multi-term course? : No
Faculty : Faculty of Engineering
Academic Unit : Graduate School of Biomedical Engineering
Delivery Mode : Multimodal
Delivery Format : Standard
Delivery Location : Kensington
Campus : Sydney
Study Level : Postgraduate, Undergraduate
Units of Credit : 6

Useful Links

Handbook Class Timetable

Course Details & Outcomes

Course Description

Medical devices can help people hear again, feel again, walk again. Do you want to participate in the process of finding the materials that are used to make medical devices? Hearing implants use platinum to return hearing sensation in profoundly deaf people, prosthetic hips made of

titanium can replace bone and restore movement, and severed nerves can be restored with nerve grafts fabricated from artificial or natural polymers. How were these biomaterials considered for these medical applications?

Engineering novel biomaterials is the essence behind the success of medical devices, yet not understanding the importance of biomaterials can result in health complication, even death. This requires evaluating biological, chemical, mechanical, and electrical properties of materials and their role in the performance of medical devices? Embark on an exploration into the realm of biomedical engineering with this course, where theory meets hands-on application. Discover the intricate role of materials in groundbreaking medical technologies.

You will engage in experiential learning, bridging theory with practice. Through lectures and workshops, you will delve into the multifaceted properties of materials essential for medical applications, spanning biology, mechanics, chemistry, and electricity. In addition, the exploration of material performance relies on biological cells to better evaluate these properties. So, roll up your sleeves for hands-on experiences. Through laboratory experiments, you will learn how biological cells and front-line tests can help screen and validate material selection for medical applications.

The curriculum is crafted to integrate material science, mechanical testing, and cellular biology. It will equip you with the necessary skills to navigate the complexities of biomaterials and cellular methodologies. Whether you are exploring the biocompatibility of new materials or deciphering cellular responses to medical devices, this interdisciplinary journey will hone your abilities and prepare you for the forefront of biomedical engineering.

This course is highly recommended for students without a background in materials science or cell biology. Students from these disciplines will gain first-hand experience in evaluating biomaterials for medical applications and interpreting cellular responses to medical devices. Conversely, students with backgrounds in materials science or cell biology will deepen their expertise through advanced discussions and practical applications tailored to biomedical contexts. Overall, this course caters to a diverse cohort of engineering students, ensuring that all participants emerge equipped with skills to contribute meaningfully to the interdisciplinary field of biomedical engineering.

This course serves as a gateway to more specialised courses aimed at understanding, designing and evaluating the biological and mechanical performance of materials used in medical devices.

Course Aims

This course aims to provide students with the knowledge and skills necessary to evaluate materials and cellular technologies in the context of biomedical applications.

The specific aims are to:

1. Expose students to diverse types of biomaterials used in medical technologies and the fundamentals of cellular biology required for biomaterial testing and validation
2. Provide students with the working principles of mechanical and biological testing of biomaterials.
3. To serve as a gateway to other biomedical engineering applications that require mechanical and biological analysis of biomaterials, especially cellular and tissue engineering, biomechanics, and implantable bionics.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Evaluate the selection criteria for biomaterials in medical applications.
CLO2 : Utilise cellular methodologies to assess material performance.
CLO3 : Execute mechanical testing procedures on biomaterials in laboratory settings.
CLO4 : Evaluate the role of emerging biomaterials in biomedical technologies.

Course Learning Outcomes	Assessment Item
CLO1 : Evaluate the selection criteria for biomaterials in medical applications.	• Lab Report • Major Project • Reflective Logbook • Quizzes
CLO2 : Utilise cellular methodologies to assess material performance.	• Lab Report • Major Project • Reflective Logbook • Quizzes
CLO3 : Execute mechanical testing procedures on biomaterials in laboratory settings.	• Lab Report • Major Project • Reflective Logbook • Quizzes
CLO4 : Evaluate the role of emerging biomaterials in biomedical technologies.	• Lab Report • Major Project • Reflective Logbook • Quizzes

Learning and Teaching Technologies

Moodle - Learning Management System | Microsoft Teams

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Lab Report Assessment Format: Individual	30%	Due Date: Week 10: 21 April - 27 April
Major Project Assessment Format: Group	30%	Due Date: In exam period
Reflective Logbook Assessment Format: Individual	20%	Due Date: Week 5: 17 March - 23 March, Week 10: 21 April - 27 April
Quizzes Assessment Format: Individual	20%	Due Date: Week 2: 24 February - 02 March, Week 3: 03 March - 09 March, Week 4: 10 March - 16 March, Week 5: 17 March - 23 March, Week 7: 31 March - 06 April, Week 8: 07 April - 13 April, Week 9: 14 April - 20 April

Assessment Details

Lab Report

Assessment Overview

This individual assessment requires students to produce a one-page paper, formatted similarly to a conference paper proceeding, where they report the key findings from their experimental work conducted during tutorials. This task encourages students to synthesize and critically discuss their results in relation to relevant literature, fostering a concise and analytical approach to understanding the selection criteria for biomaterials in medical applications (CLO1, and CLO4), evaluating the effectiveness of experimental tests for assessing material performance, and examining the role of emerging biomaterials in biomedical devices (CLO2, and CLO3). Through this exercise, students will develop a nuanced perspective on the strengths and limitations of their methodologies, enhancing their ability to critically assess biomaterial performance in real-world applications. Grading will be performed via a rubric.

Course Learning Outcomes

- CLO1 : Evaluate the selection criteria for biomaterials in medical applications.
- CLO2 : Utilise cellular methodologies to assess material performance.
- CLO3 : Execute mechanical testing procedures on biomaterials in laboratory settings.
- CLO4 : Evaluate the role of emerging biomaterials in biomedical technologies.

Assessment information

Attendance to the laboratory sessions is required for submission of this assessment

Assignment submission Turnitin type

This assignment is submitted through Turnitin and students can see Turnitin similarity reports.

Generative AI Permission Level

Simple Editing Assistance

In completing this assessment, you are permitted to use standard editing and referencing functions in the software you use to complete your assessment. These functions are described below. You must not use any functions that generate or paraphrase passages of text or other media, whether based on your own work or not.
If your Convenor has concerns that your submission contains passages of AI-generated text or media, you may be asked to account for your work. If you are unable to satisfactorily demonstrate your understanding of your submission you may be referred to UNSW Conduct & Integrity Office for investigation for academic misconduct and possible penalties.
For more information on Generative AI and permitted use please see here.

Additional AI information

Students are strongly advised to avoid using AI tools. AI is strictly prohibited for content generation, including but not limited to using rubric criteria as input, summarising or paraphrasing research articles, others' work, or internet content. AI may only be used for editing, such as checking for typos, grammar, or syntax. If students choose to use AI, they must generate their own ideas and initial drafts without AI input and maintain a log detailing the input, prompts, and output. In cases of high AI similarity scores, logs will be required to resolve disputes.

Major Project

Assessment Overview

A key element of this course is the major project in which students will present on the performance of a specific biomaterial selected at the beginning of the course. The group presentation will be assessed by academic staff (20%), invited panellists (5%) and, peer students (5%). The presentation criteria are focused on challenging students to present their project in professional manner while delivering a clear and informative message to the audience. This forces the students to develop effective communication skills to inform on abstract concepts and, in the process, enhances the learning experience. Grading will be performed via a rubric.

Course Learning Outcomes

- CLO1 : Evaluate the selection criteria for biomaterials in medical applications.
- CLO2 : Utilise cellular methodologies to assess material performance.
- CLO3 : Execute mechanical testing procedures on biomaterials in laboratory settings.
- CLO4 : Evaluate the role of emerging biomaterials in biomedical technologies.

Assessment information

Due to the Easter Monday clash on Week 10 this assessment will take place during the examination period, time and date to be defined later in the Term.

Assignment submission Turnitin type

Not Applicable

Generative AI Permission Level

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Reflective Logbook

Assessment Overview

The reflective log (20%) assesses depth of reflection, ability to connect theory with practice,

clarity of insights, and self-awareness. Structured prompts will cue students to reflect on 1) relationships between theory and practice, 2) strengths and limitations of the techniques used for assessing material performance, and 3) reflect on a specific emerging biomaterial discussed in class or tutorials. Grading will be performed via a rubric.

Course Learning Outcomes

- CLO1 : Evaluate the selection criteria for biomaterials in medical applications.
- CLO2 : Utilise cellular methodologies to assess material performance.
- CLO3 : Execute mechanical testing procedures on biomaterials in laboratory settings.
- CLO4 : Evaluate the role of emerging biomaterials in biomedical technologies.

Assignment submission Turnitin type

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Generative AI Permission Level

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Quizzes

Assessment Overview

Each small class activity will conclude with an online quiz, which integrates concepts from lectures into tutorial practices. The tutorials will be evenly distributed across the course learning outcomes and will be automatically graded.

Course Learning Outcomes

- CLO1 : Evaluate the selection criteria for biomaterials in medical applications.
- CLO2 : Utilise cellular methodologies to assess material performance.
- CLO3 : Execute mechanical testing procedures on biomaterials in laboratory settings.
- CLO4 : Evaluate the role of emerging biomaterials in biomedical technologies.

Assignment submission Turnitin type

Not Applicable

Generative AI Permission Level

No Assistance

This assessment is designed for you to complete without the use of any generative AI. You are not permitted to use any generative AI tools, software or service to search for or generate information or answers.
For more information on Generative AI and permitted use please see here.

General Assessment Information

Grading Basis

Standard

Course Schedule

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

Course Resources

Recommended Resources

Biomaterials Science - An Introduction to Materials in Medicine (4th Edition) - **Available online** via Moodle

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Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Lecturer	Ulises Aregueta Robles		Room 1001, E26, Level 1		Monday to Wednesday. Meetings are by appointment only	Yes	Yes

Other Useful Information

Academic Information

I. Special consideration and supplementary assessment

If you have experienced an illness or misadventure beyond your control that will interfere with your assessment performance, you are eligible to apply for Special Consideration prior to, or within 3 working days of, submitting an assessment or sitting an exam.

Please note that UNSW has a Fit to Sit / Submit rule, which means that if you sit an exam or submit a piece of assessment, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

For details of applying for Special Consideration and conditions for the award of supplementary assessment, please see the information on UNSW's Special Consideration page.

II. Administrative matters and links

All students are expected to read and be familiar with UNSW guidelines and polices. In particular, students should be familiar with the following:

- Attendance
- UNSW Email Address
- Special Consideration
- Exams
- Approved Calculators
- Academic Honesty and Plagiarism

- Equitable Learning Services

III. Equity and diversity

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equitable Learning Services. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

Note: This course outline sets out the description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle or your primary learning management system (LMS) should be consulted for the up-to-date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline/Moodle/LMS, the description in the Course Outline/ Moodle/LMS applies.

Academic Honesty and Plagarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.*

Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. UNSW has produced a website with a wealth of resources to support students to understand and avoid plagiarism, visit: student.unsw.edu.au/plagiarism. The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also

be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis or contract cheating) even suspension from the university. The Student Misconduct Procedures are available here:

www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf

Submission of Assessment Tasks

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of five percent (5%) for that assessment item.

The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way through a day. This is for all assessments where a penalty applies.

Work submitted after five days (120 hours) will not be accepted and a mark of zero will be awarded for that assessment item.

For some assessment items, a late penalty may not be appropriate. These will be clearly indicated in the course outline, and such assessments will receive a mark of zero if not completed by the specified date. Examples include:

- Weekly online tests or laboratory work worth a small proportion of the subject mark;
- Exams, peer feedback and team evaluation surveys;
- Online quizzes where answers are released to students on completion;
- Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date; and,
- Pass/Fail assessment tasks.

Faculty-specific Information

Engineering Student Support Services – The Nucleus - enrolment, progression checks, clash requests, course issues or program-related queries

Engineering Industrial Training – Industrial training questions

UNSW Study Abroad – study abroad student enquiries (for inbound students)

UNSW Exchange – student exchange enquiries (for inbound students)

UNSW Future Students – potential student enquiries e.g. admissions, fees, programs, credit transfer

Phone

(+61 2) 9385 8500 – Nucleus Student Hub

School Contact Information

Student Services can be contacted via unsw.to/webforms.