BIOM9332

Biocompatibility

Term Two // 2021

Graduate School of Biomedical Engineering // UNSW Engineering

Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Jelena Rnjak-Kovacina	j.rnjak-kovacina@unsw.edu.au		Samuels 507	9385 3920

School Contact Information

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

Course Details

Credit Points 6

Summary of the Course

This course outlines the concepts of biocompatibility with emphasis on understanding biological responses to a range of biomaterials and medical devices.

Course Aims

The overall aims of this course are to:

- Understand fundamental concepts related to biological performance of materials used in medical devices.
- Apply knowledge of biological performance concepts to development of preclinical evaluation programs for medical materials and devices, in particular tissue engineered devices that incorporate biological materials and cultured cells.

Course Learning Outcomes

After successfully completing this course, you should be able to:

Learning Outcome	EA Stage 1 Competencies
1. Describe biomaterial classes, their general properties, and predict how specific materials may be affected by physiological conditions	PE1.1, PE3.2
2. Explain the principles of tissue engineering and apply these to novel medical device designs	PE1.2, PE3.2
3. Explain how material processing, sterilisation and handling may affect medical device function	PE1.2, PE3.3, PE3.2
4. Describe host responses to biomaterials and predict host responses to novel medical device designs	PE1.2, PE3.6, PE1.4, PE3.2
5. Describe biocompatibility and pre-clinical biological performance testing regimes, and propose a testing regime for a novel medical device	PE1.2, PE2.1, PE2.2, PE3.3, PE1.4, PE3.2

Teaching Strategies

A combination of lectures, in class activities, tutorials, and independent and group learning tasks are used in this course to expose students to a range of teaching modes. For each hour of contact students are expected to put in at least 1.5 hours of private study.

Private Study	• Complete any assigned pre-work and post-work • Review lecture materials • Note any questions you have from lecture materials • Work through activities and do set assignments • Reflect on class problems and assignments • Download and work through materials from Moodle • Keep up with notices and find out marks via Moodle • Interact with your peers
Lectures	• Find out what you must learn • Follow worked examples • Look out for announcements on Moodle • Ask questions and participate in class discussions/activities
Tutorials	• Hands-on work to set lecture course materials in context • Practice solving set problems • Ask questions and participate in all activities
Assessments	• Demonstrate your knowledge and skills • Demonstrate higher understanding and problem solving • Build teamwork and communication skills • Start assignments early & ask for clarification early

Additional Course Information

This course outlines the concepts of biocompatibility with emphasis on understanding biological responses to a range of biomaterials and medical devices. The course consists of 4h of face-to-face time per week, including lectures and tutorials. Additional independent learning is expected based on guidelines provided throughout the semester, including reading of course materials, additional recommended tasks, and completion of assessment tasks.

This course compliments other BIOM courses including Cellular and Tissue Engineering, Mechanical Properties of Biomaterials, Regulatory Requirements for Biomedical Technology, Clinical Laboratory Science and certain thesis topics.

Assessment

Assessment Tasks

Assessment task	Weight	Due Date	Student Learning Outcomes Assessed
Major Quiz	20%	TBD	1, 2, 3, 4, 5
Final Exam	40%	TBD	1, 2, 3, 4, 5
Major Project - Part 1	10%	TBD	1, 2, 3, 4, 5
Major Project - Part 2	18%	TBD	1, 2, 3, 4, 5
Major Project - Part 3	10%	TBD	1, 2, 3, 4, 5
Major Project - Part 4	2%	TBD	1, 2, 3, 4, 5

Assessment Details

Assessment 1: Major Quiz

Details:

Multiple choice, true false and short answer in-class quiz, closed book

Turnitin setting: This is not a Turnitin assignment

Assessment 2: Final Exam

Details:

Final exam, individual

Assessment 3: Major Project - Part 1

Details:

The Major Project that involves developing a conceptual framework for improved biocompatibility testing of medical devices. This task is designed to foster team work and put the theory into action. Part 1 is submitted individually.

Turnitin setting: This is not a Turnitin assignment

Assessment 4: Major Project - Part 2

Details:

The Major Project that involves developing a conceptual framework for improved biocompatibility testing of medical devices. This task is designed to foster team work and put the theory into action. Part 2 is submitted as a group.The groups will be formed in the first tutorial.

Turnitin setting: This is not a Turnitin assignment

Assessment 5: Major Project - Part 3

Details:

The Major Project that involves developing a conceptual framework for improved biocompatibility testing of medical devices. This task is designed to foster team work and put the theory into action. Part 3 is submitted as a group.The groups will be formed in the first tutorial.

Turnitin setting: This is not a Turnitin assignment

Assessment 6: Major Project - Part 4

Details:

The Major Project that involves developing a conceptual framework for improved biocompatibility testing of medical devices. This task is designed to foster team work and put the theory into action. Part 4 is submitted individually.

Attendance Requirements

Students are required to attend their timetabled tutorials. Inability to attend a tutorial should be discussed with the course convenor.

Course Schedule

View class timetable

Timetable

Date	Type	Content
O Week: 25 May - 28 May		
Week 1: 31 May - 4 June	Lecture	Intro to BIOM9332 Intro to biocompatibility
Week 2: 7 June - 11 June	Lecture	Biocompatibility concepts cont. Biomaterials
Week 3: 14 June - 18 June	Lecture	
Week 4: 21 June - 25 June	Lecture	Cells, ECM, Cell—ECM interactions
Week 5: 28 June - 2 July	Lecture	ISO10993
Week 6: 5 July - 9 July		
Week 7: 12 July - 16 July	Lecture	Tissue Engineering & Sterilisation
Week 8: 19 July - 23 July	Lecture	Host responses 1- Immune system 101
Week 9: 26 July - 30 July	Lecture	Host responses 2- Immune system & biomaterials
Week 10: 2 August - 6 August	Lecture	Host responses 3- Blood interactions

Resources

Recommended Resources

Course Evaluation and Development

Submission of Assessment Tasks

Laboratory reports and major assignments will require a Non Plagiarism Declaration Cover Sheet.

Late submissions will be penalised 10% of the mark for each calendar day late. If you foresee a problem in meeting the nominated submission date please contact the Course Convenor to make an appointment to discuss your situation as soon as possible.

Academic Honesty and Plagiarism

PLAGIARISM

Beware! An assignment that includes plagiarised material will receive a 0% Fail, and students who plagiarise may fail the course. Students who plagiarise will have their names entered on a plagiarism register and will be liable to disciplinary action, including exclusion from enrolment.

It is expected that all students must at all times submit their own work for assessment. Submitting the work or ideas of someone else without clearly acknowledging the source of borrowed material or ideas is plagiarism.

All assessments which you hand in must have a Non Plagiarism Declaration Cover Sheet. This is for both individual and group work. Attach it to your assignment before submitting it to the Course Coordinator or at the School Office.

Plagiarism is the use of another person's work or ideas as if they were your own. When it is necessary or desirable to use other people's material you should adequately acknowledge whose words or ideas they are and where you found them (giving the complete reference details, including page number(s)). The Learning Centre provides further information on what constitutes Plagiarism at:
https://student.unsw.edu.au/plagiarism

Academic Information

COURSE EVALUATION AND DEVELOPMENT
Student feedback has helped to shape and develop this course, including feedback obtained from on-line evaluations as part of UNSW's as part of UNSW's myExperience process. You are highly encouraged to complete such an on-line evaluation toward the end of Term. Feedback and suggestions provided will be important in improving the course for future students.

DATES TO NOTE
Refer to MyUNSW for Important Dates, available at:
https://my.unsw.edu.au/student/resources/KeyDates.html

ACADEMIC ADVICE
For information about:

- Notes on assessments and plagiarism,
- Special Considerations,
- School Student Ethics Officer, and
- BESS

refer to the School website available at
http://www.engineering.unsw.edu.au/biomedical-engineering/

Supplementary Examinations:

Supplementary Examinations for Term 2 2021 will be held on Monday 6th September – Friday 10th September (inclusive) should you be required to sit one.

Image Credit

Synergies in Sound 2016

CRICOS

CRICOS Provider Code: 00098G

Acknowledgement of Country

We acknowledge the Bedegal people who are the traditional custodians of the lands on which UNSW Kensington campus is located.

Appendix: Engineers Australia (EA) Professional Engineer Competency Standard

Program Intended Learning Outcomes	
Knowledge and skill base	
PE1.1 Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline	✓
PE1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline	✓
PE1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline	
PE1.4 Discernment of knowledge development and research directions within the engineering discipline	✓
PE1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline	
PE1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline	
Engineering application ability	
PE2.1 Application of established engineering methods to complex engineering problem solving	✓
PE2.2 Fluent application of engineering techniques, tools and resources	✓
PE2.3 Application of systematic engineering synthesis and design processes	
PE2.4 Application of systematic approaches to the conduct and management of engineering projects	
Professional and personal attributes	
PE3.1 Ethical conduct and professional accountability	
PE3.2 Effective oral and written communication in professional and lay domains	✓
PE3.3 Creative, innovative and pro-active demeanour	✓
PE3.4 Professional use and management of information	
PE3.5 Orderly management of self, and professional conduct	
PE3.6 Effective team membership and team leadership	✓