Course Details

Time: Wednesdays, 2 – 5 pm  
Venue:  
Lectures: CLB1  
Tutorials: CLB1, Samuels 513  
Laboratory: Biosciences, Room 107

Learning management system: Moodle

Staff Contact Details

Staff are available by appointment. Please contact the relevant staff member by phone or email to arrange an appointment time.

Course Convenor

<table>
<thead>
<tr>
<th>Name</th>
<th>Email</th>
<th>Phone</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr Megan Lord (ML)</td>
<td><a href="mailto:m.lord@unsw.edu.au">m.lord@unsw.edu.au</a></td>
<td>9385 3910</td>
<td>Samuels Building, Level 5, Room 505</td>
</tr>
</tbody>
</table>

Lecturers

<table>
<thead>
<tr>
<th>Name</th>
<th>Email</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr Brooke Farrugia (BF)</td>
<td><a href="mailto:b.farrugia@unsw.edu.au">b.farrugia@unsw.edu.au</a></td>
<td>Samuels Building, Level 4, Room 434</td>
</tr>
<tr>
<td>Dr Jelena Rnjak-Kovacina (JR)</td>
<td><a href="mailto:j.rnjak-kovacina@unsw.edu.au">j.rnjak-kovacina@unsw.edu.au</a></td>
<td>Samuels Building, Level 4, Room 434</td>
</tr>
<tr>
<td>Prof John Whitelock (JW)</td>
<td><a href="mailto:j.whitelock@unsw.edu.au">j.whitelock@unsw.edu.au</a></td>
<td>Samuels Building, Level 5, Room 525</td>
</tr>
<tr>
<td>A/Prof Patrick Spicer (PS)</td>
<td><a href="mailto:p.spicer@unsw.edu.au">p.spicer@unsw.edu.au</a></td>
<td>Chemical Engineering, Level 8, Room 810</td>
</tr>
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Course Objectives

BIOM9333 Cellular and Tissue Engineering outlines the concepts of cell-based products for the pharmaceutical and medical industries from both a theoretical and practical perspective.

This course will cover the basis of how proteins are produced by cells; recombinant technologies to produce proteins and biologics from bacterial, mammalian and viral systems; process design and optimisation needed for commercial production of biologicals; case studies of currently manufactured biological products; cell isolation
including blood and progenitor cells; and translation of these technologies for tissue engineering and regenerative medicine.

Aims of the Course

- To introduce students to the concepts of recombinant protein expression, cell-based therapies and processing of biologics relevant to the current and future pharmaceutical and medical industries.
- To develop problem solving skills for the medical field.
- To contextualise the learning with practical activities and a site visit.

Student learning outcomes

At the conclusion of the course students will have gained:

- an understanding of the underlying principles of developing and processing commercial quantities of biologics for the pharmaceutical and medical industries.
- problem solving skills in the medical field.
- teamwork skills and an understanding of an individual’s strengths in a team environment.
- tools for independent and curiosity driven learning.
- communication skills in scientific writing.
- exposure to a laboratory environment.

At the conclusion of the course students will have developed the following skills:

- tools for independent and curiosity driven learning.
- tools for collaborative discussion and learning.
- communication skills in scientific writing and presentation.

At the conclusion of the course students will have developed the following Graduate Capabilities:

- understanding of their discipline in its interdisciplinary context
- capable of independent and collaborative enquiry
- rigorous in their analysis, critique and reflection
- able to apply their knowledge and skills to solving problems
- capable of effective communication
- information literate
- enterprising, innovative and creative
- collaborative and effective team workers
- capable of independent, self-directed practice
- capable of lifelong learning
Teaching strategies used in the course

A combination of lectures, tutorials, laboratory classes and a site visit are used in this course to expose students to a range of teaching modes. These modes encompass a range of teaching styles, including passive and active participation.

Lectures

Lectures provide information for the content areas covered in the course. Students are expected to take notes and lecture slides will be available on Moodle shortly after the lecture.

Tutorial Sessions

Tutorial sessions provide the opportunity to work through some of the example problems relating to the lecture material. This is also the forum to work through activities associated with the major project.

Practical Classes

Practical classes will be held in Weeks 4 - 7. These classes provide for an opportunity to gain hands-on experience relevant to the course. You must complete the Risk Assessment Tasks on Moodle prior to gaining access to the laboratory classes to ensure that you understand the risks and control measures.

You must bring the following personal protective equipment to the laboratory class in week 4:

- laboratory coat
- safety goggles
- enclosed shoes

If you are unable to attend a laboratory class, contact the Course Convenor as soon as you know you are unable to attend to discuss alternative arrangements for your course assessment.

Site Visit

There will be a site visit to the Australian Red Cross Blood Service, Alexandria during class in week 11. This is to complement the lectures, particularly those related to blood cell processing.
## Course Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Day</th>
<th>Activity</th>
<th>Lecturer</th>
<th>Location</th>
<th>Assessment Task Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5/3</td>
<td>Course Introduction and Protein Biochemistry and Cell biology</td>
<td>ML</td>
<td>CLB1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>12/3</td>
<td>Recombinant protein production - Bacterial systems</td>
<td>JR</td>
<td>CLB1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>19/3</td>
<td>Recombinant protein production - Mammalian cells and viral vectors</td>
<td>JW</td>
<td>CLB1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>26/3</td>
<td><strong>Activity:</strong> DNA and protein gel electrophoresis</td>
<td>ML</td>
<td>Biosciences Room 107</td>
<td>Quiz 1 (5%)</td>
</tr>
<tr>
<td>5</td>
<td>2/4</td>
<td>Bioseparation processes</td>
<td>ML</td>
<td>CLB1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>9/4</td>
<td>Process design and optimisation</td>
<td>ML</td>
<td>CLB1</td>
<td>Lab report (10%)</td>
</tr>
<tr>
<td>7</td>
<td>16/4</td>
<td><strong>Activity:</strong> Process modelling</td>
<td>ML</td>
<td>Tutorial rooms</td>
<td>Quiz 2 (5%)</td>
</tr>
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### Mid-session Break

<table>
<thead>
<tr>
<th>Week</th>
<th>Day</th>
<th>Activity</th>
<th>Lecturer</th>
<th>Location</th>
<th>Assessment Task Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>30/4</td>
<td>Case studies: Process design for commercial products - Naturally derived products <strong>Tutorial A:</strong> problems and group presentations</td>
<td>BF</td>
<td>CLB1</td>
<td>Tutorial Rooms</td>
</tr>
<tr>
<td>9</td>
<td>7/5</td>
<td>Case studies: Process design for commercial products - Recombinant products <strong>Tutorial B:</strong> problems and group presentations</td>
<td>JW</td>
<td>CLB1</td>
<td>Tutorial Rooms</td>
</tr>
<tr>
<td>10</td>
<td>14/5</td>
<td>Case Studies: Cell-based therapies/bioreactors <strong>Tutorial C:</strong> problems and group presentations</td>
<td>ML</td>
<td>CLB1</td>
<td>Tutorial Rooms</td>
</tr>
<tr>
<td>11</td>
<td>21/5</td>
<td><strong>Site visit:</strong> Australian Red Cross Blood Service</td>
<td>ML</td>
<td>Alexandria</td>
<td>Quiz 3 (5%)</td>
</tr>
<tr>
<td>12</td>
<td>28/5</td>
<td>Translation from bench top to bedside Tissue engineering and regenerative medicine</td>
<td>PS</td>
<td>CLB1</td>
<td>Major Report (25%)</td>
</tr>
<tr>
<td>13</td>
<td>4/6</td>
<td>Revision Session</td>
<td>ML</td>
<td>CLB1</td>
<td></td>
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</tbody>
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Exam period | Final Exam (50%) |
Assessment Tasks
The assessment tasks for BIOM9333 Cellular and Tissue Engineering have been
designed to measure your achievement of the learning outcomes.

Assessments must be submitted to the course convenor at the start of the scheduled
class time on the nominated submission day. Each submitted assignment must contain
the Assignment Cover Page which can be downloaded from
http://www.engineering.unsw.edu.au/biomedical‐
ingineering/sites/biomed/files/uploads/gsbme_non_plagiarism_declaration%5B1%5D.pdf

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.

Assessment marks will be available on Moodle as soon as they have been marked, which
will usually be within 2 weeks of submission. Assessment documents will be available in
the class following assessment mark release on Moodle and subsequently via the School
Reception on Level 5 Samuels Building upon displaying your student ID card.

<table>
<thead>
<tr>
<th>Assessment Task</th>
<th>Total course assessment (%)</th>
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<tbody>
<tr>
<td><strong>Online Quizzes</strong></td>
<td>15</td>
</tr>
<tr>
<td>Online quizzes will consist of multiple choice and short answer questions and are designed to encourage learning throughout the semester and prepare students for the types of questions in the final exam. These quizzes are available on Moodle. Each quiz is worth 5% of the total assessment for the course. Quiz 1 is due by <strong>Week 4, Wednesday 26th March, 2014</strong> Quiz 2 is due by <strong>Week 7, Wednesday 16th April, 2014</strong> Quiz 3 is due by <strong>Week 11, Wednesday 21st May, 2014</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Biological Process Design Project</strong></td>
<td>25</td>
</tr>
<tr>
<td>The biological process design project will explore the processing of a commercially available biological product. This task is designed to foster team work and put the theory into action. This report is due by <strong>Week 12, Wednesday 28th May, 2014</strong> and includes a group presentation (due in weeks 8 – 10).</td>
<td></td>
</tr>
<tr>
<td><strong>Lab report</strong></td>
<td>10</td>
</tr>
<tr>
<td>A laboratory report for the DNA and protein laboratory class is worth 10% of the total assessment for the course. This task is designed to teach students how to write scientific reports. This report is due by <strong>Week 6, Wednesday 9th April, 2014</strong>.</td>
<td></td>
</tr>
<tr>
<td><strong>Final Exam</strong></td>
<td>50</td>
</tr>
<tr>
<td>The final exam will be a closed book exam with a combination of multiple choice and short answer questions. The final exam will be held during the formal exam period. Materials allowed: University approved calculator.</td>
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</table>
Resources for Students

Internet
Moodle will contain, where available, all course materials including lecture slides, problem solving materials, laboratory notes, risk assessments, online quizzes and details of all assessment tasks which can be accessed from http://www.telt.unsw.edu.au
Notices relevant to the course will be posted on Moodle.
It is expected that students will check this site regularly to stay informed about the course.

Reference Textbooks
Bioprocess Engineering – Basic Concepts (2nd edition)

Academic Honesty and Plagiarism
Academic Honesty and Plagiarism. The Graduate School of Biomedical Engineering has adopted in its entirety the UNSW policy on plagiarism, which defines several steps in dealing with plagiarism of varying levels of severity. Details of the Graduate School of Biomedical Engineering policies on academic matters can be viewed at:
The UNSW policy on plagiarism can be viewed at:
The definition of plagiarism can be viewed at:
http://www.lc.unsw.edu.au/plagiarism/pintro.html
You are required to complete and sign a non-plagiarism declaration form for each assignment submitted which can be downloaded from
The University maintains a central record of students who have infringed the plagiarism policy. Within the School the record is accessible only to the Head of School. Further penalties apply for repeat offences.

Course Evaluation and Development
Course feedback will be gathered throughout the course through the Discussion Tool available on Moodle and at the end of the course through the Course and Teaching Evaluation and Improvement (CATEI) form. Participation in these evaluation tools is highly encouraged and appreciated.
Your feedback is carefully reviewed and implemented where appropriate to allow continual improvement of the course. Feedback received in 2012 has resulted in the following changes to the course this year:
- Revision of the course content.
- Incorporation of practical activities.
Additional Information

Advice concerning illness or misadventure

If you believe that your performance in an assessable component has been affected by illness or other unexpected circumstance you should talk to the course convenor to discuss the best plan of action. You should make an application for special consideration as soon as possible after the event by visiting UNSW Student Central. Note that considerations are not granted automatically.

Census Date

The last day to discontinue a course without financial and academic penalty is 31 March, 2014. The last day to discontinue without failure is 20 April, 2014.

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 Equity and Diversity Unit (9385 4734 or http://www.studentequity.unsw.edu.au). 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.

Occupational Health and Safety

UNSW has strict policies and expectations on Occupational Health and Safety which may be accessed from http://www.ohs.unsw.edu.au/

Special Consideration

Details about the University’s policy on Special Consideration, including how to apply, can be found at: https://my.unsw.edu.au/student/atoz/SpecialConsideration.html

Student Support Services

UNSW has a wide range of support services. The resources listed Students who have a disability that requires some adjustment in their learning and teaching environment are encouraged to discuss their study needs with the Course Convener prior to, or at the commencement of the course, or with the Student Equity Officers (Disability) in the Student Equity and Diversity Unit (9385 4734). Information for students with disabilities is available at: http://www.studentequity.unsw.edu.au Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional examination and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.