

SOMS3232

Cellular Mechanisms of Health and Disease

Course Outline
Term 2, 2022

School of Medical Sciences
Faculty of Medicine & Health

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1. Staff

Position	Name	Email	Consultation times and locations	Contact Details
Course Convenor	Till Böcking	till.boecking@unsw.edu.au	Tuesdays 9-10 or by appointment; Teams or in person (by appointment)	see email, Lowy Building Level 3, Ph: 9065 5603
Course Convenor	Edna Hardeman	e.hardeman@unsw.edu.au	by appointment	see email
Lecturer	Vaishnavi Ananthanarayanan	vaish@unsw.edu.au	by appointment	see email
Lecturer	Maté Biro	m.biro@unsw.edu.au	by appointment	see email
Lecturer	Yann Gambin	y.gambin@unsw.edu.au	by appointment	see email
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Lecturer	John Lock	john.lock@unsw.edu.au	by appointment	see email
Lecturer	Kate Poole	k.poole@unsw.edu.au	by appointment	see email
Lecturer	Emma Sierecki	e.sierecki@unsw.edu.au	by appointment	see email

2. Course information

Units of credit: 6

Pre-requisite(s): ANAT3231 or BIOC2101 or BIOC2181 or BABS2202 or (ANAT2241 and PHSL2101)

Teaching times and locations: [Class Details SOMS3232 \(unsw.edu.au\)](#)

- Journal Club (Seminar): Tue, 10:00-12:00, Wallace Wurth LG02, Weeks 1-5,7-10
- Research lecture: Wed, 16:00-18:00, Wallace Wurth LG02, Weeks 1-5,7-10
- Lab component (lab embedment): to be negotiated

2.1 Course summary

This course in molecular medicine bridges the gap between the fundamental sciences of cell biology/biochemistry/immunology and their therapeutic applications. It conveys the dynamic process of scientific discovery in areas of research strengths in biomedicine at UNSW by a focus on novel techniques bringing about paradigm shifts in our understanding of cell function and our ability to diagnose and treat diseases. Students will engage closely with researchers and will develop a range of skills to prepare them for research-oriented careers in academia and industry.

2.2 Course aims

The primary aim of the course is to teach students some of the molecular and cellular processes that drive normal cell function and how subtle changes can lead to a range of common diseases. These concepts will be presented in the context of cutting-edge research to highlight how research outcomes can inform development of technologies, drugs, and clinical practice ("bench to bedside").

Secondly, the aim is to convey the recent transformation of biomedical research to a quantitative discipline, the incorporation of approaches from the physical sciences (biophysics, chemistry, mathematics, engineering) and the invention of new methodologies that have opened new fields (e.g. transgenic animals, gene editing, imaging and microscopy). Overall, the course is designed to raise the students' curiosity about how a cell works, what the big questions are, how these can be addressed experimentally and how these discoveries relate to our understanding of human health and disease. Lecturers will be tasked to convey the excitement of cutting-edge research including its challenges and controversies. Interaction between the lecturer and the students is desired to facilitate critical thinking.

2.3 Course learning outcomes (CLO)

At the successful completion of this course you (the student) should be able to:

1. Describe the molecular and cellular mechanisms that underlie a range of common diseases such as cancer, metabolic disorders and immune diseases.
2. Analyse the process of scientific research and the appraise the role of transforming technologies in advancing our knowledge.
3. Understand strategies for translation of research into technologies and treatments.
4. Analyse scientific literature, integrate and contrast scientific data from different sources to synthesise new models and hypotheses; participate in scientific discussions.
5. Use reflective practice to integrate knowledge, skills and experience of scientific research.

2.4 Relationship between course learning outcomes and assessments

Course Learning Outcome (CLO)	LO Statement	Related Tasks & Assessment
CLO 1	Describe the molecular and cellular mechanisms that underlie a range of common diseases such as cancer, metabolic disorders and immune diseases.	Tasks: Research lectures Assessment: ePortfolio
CLO 2	Analyse the process of scientific research and the appraise the role of transforming technologies in advancing our knowledge	Tasks: Journal club (seminars), Lab component Assessment: Literature Oral Presentation, Project Assignment
CLO 3	Understand strategies for translation of research into technologies and treatments	Tasks: Lab component Assessment: Project Assignment

CLO 4	Analyse scientific literature, integrate and contrast scientific data from different sources to synthesise new models and hypotheses; participate in scientific discussions.	Tasks: Research lectures, Journal club (seminars) Assessment: ePortfolio, Literature Oral Presentation
CLO 5	Use reflective practice to integrate knowledge, skills and experience of scientific research.	Tasks: Research lectures Assessment: ePortfolio

3. Strategies and approaches to learning

3.1 Learning and teaching activities

Overview: Research lectures will provide you with the concepts and theory essential for an understanding of the cellular and molecular basis of human health. Seminars and a lab component assist in the development of research and analytical and problem-solving skills. These sessions allow students to engage in a more interactive form of learning than is possible in the research seminars. The skills you will learn in lab classes are relevant to your development as professional scientists.

Research lectures, seminars and lab components will be delivered face-to-face, with an option for online participation for students who are overseas.

Research lectures (9 x 2 h): Lecture topics will be grouped into themes and lectures within themes will be organised to provide a logical progression of key concepts. An overview over the course and how different themes relate to each other will be provided by the course convenor in the first lecture.

Lectures will be held primarily by experts with an active research program in the topic area. Each expert presents a set of two lectures. The first lecture is a general introduction to the topic including fundamental concepts as well as posing the current open question(s) and introducing competing theories. The second lecture focuses on new methodologies that allow researchers to address these questions and will highlight recent advances in the field. This can include examples from the recent literature including the lecturer's own research.

A blended learning component will be incorporated as follows: Students will be required to review online material and post blog entries on this material prior to attending the 2 h lecture block for each research topic. This is followed by a post-lecture reflection/discussion of blog entries. Both components form part of the ePortfolio.

Seminars with student presentations/class discussion ("Journal club") (9 x 2 h): Each 2 h lecture block is accompanied by a separate 2 h student seminar (facilitated by the lecturer/course convenor). Each week different student groups will prepare a 20-min presentation on a research paper assigned by the lecturer. Each presentation will be followed by questions and serve as a starting point for class discussion. Students will be actively engaged in the learning process by participating in discussions and providing feedback to peers for their oral presentations.

(3) Lab component: Laboratory embedment/small group project: Student groups will be teamed up with lecturers to visit their research labs and learn about the research area and experimental approaches used in the lab. This activity will be facilitated by a lab member (postgraduate student or postdoc) to allow students participating in the course to learn from peers. The lab head will assign a project in which the students are tasked to design an experiment to address a research question.

3.2 Expectations of students

Students are reminded that UNSW recommends that a 6 units-of-credit course should involve about 150 hours of study and learning activities. The formal learning activities total approximately 50 hours throughout the term and students are expected (and strongly recommended) to do 100 hours of additional study.

Research lectures

Students are expected to attend research lectures (2 h per week) for their full duration. Students are encouraged to engage with the lecturer by engaging in discussion in response to questions/scenarios posed by the lecturer and can ask questions during and after the lectures to clarify content from the lecture and/or the pre-lecture reading materials.

Students are expected to prepare for the lecture as follows: (1) Engage with the material posted for each lecture on Moodle and (2) submit a blog post as part of their ePortfolio answering the pre-lecture questions (see Section 5.1). After the lecture, students are expected to participate in reflection and discussion by commenting on their own and each other's blog posts (see Section 5.1).

Journal club (seminar)

Students are expected to attend all journal club sessions (2h per week) for their full duration. Students are expected to participate in Q&A and discussion and provide feedback on the presentations of peers.

Students are expected to prepare and present a journal club presentation in their assigned group (see Section 5.1).

Lab component (lab embedment)

Groups of students will be assigned to the laboratories of lecturers, where they will be teamed up with a lab member. Students are expected to attend two lab sessions (date and time by negotiation within the group and the lab member). The group will then work on a project assignment related to the laboratory placement (see Section 5.1).

4. Course schedule and structure

This course consists of 50 hours of class contact hours. You are expected to take an additional 100 hours of non-class contact hours to complete readings and assessments.

Week	Research lecture (Tue, 10:00-12:00, Wallace Wurth LG02)	Journal Club (Wed, 16:00-18:00, Wallace Wurth LG02)
1	Course overview (Böcking)	Infection & Immunity I (Böcking)
2	Infection & Immunity II (Böcking/Jacques)	Infection & Immunity II (Böcking/Jacques)
3	Infection & Immunity III (Goyette)	Infection & Immunity III (Goyette)
4	Cell- & Mechanobiology I (Biro)	Cell- & Mechanobiology I (Biro)
5	Cell- & Mechanobiology II (Ananthanarayanan)	Cell- & Mechanobiology II (Ananthanarayanan)
6	-	-
7	Cell- & Mechanobiology III (Poole)	Cell- & Mechanobiology III (Poole)
8	Cancer I (Lock)	Cancer I (Lock)
9	Cancer III (Hardeman/Gunning)	Cancer III (Hardeman/Gunning)
10	Neurodegeneration (Sierecki/Gambin)	Neurodegeneration (Sierecki/Gambin)

There is no exam for this course.

5. Assessment

5.1 Assessment tasks

ePortfolio/reflective journal **50%**

Literature Oral Presentations **20%**

- Literature Oral Presentations **15%**
- Literature Oral Presentations – Peer Assessment **5%**

Literature Discussion **10%**

Project Assignment- Lab component **20%**

- Project Assignment **15%**
- Project Assignment – Peer Assessment **5%**

ePortfolio/reflective journal [50 marks]

Students will be required to keep an ePortfolio on Moodle. Entries will be guided by the material and a set of questions on Moodle. The weekly entry consists of two components:

(1) Pre-lecture blog post (limit of 750 words plus references): Students individually answer the questions on the online material posted by the lecturer *before* the corresponding research lecture. At this stage each student can only see their own entry.

(2) Post-lecture comments: Students can now read everybody's posts and are expected to reflect on the topic after the research seminar. Students are expected to post comments on their own and each other's pre-lecture blog entries.

Marking: 10 marks (Individual) per weekly entry broken down into the two components (7 marks for the pre-lecture blog post + 3 marks for post-lecture comments). The top five weekly marks are counted towards the total mark (out of 50 marks) for this assessment task.

Literature Oral Presentation [20 marks] and Literature Discussion [10 marks]

Groups of students will present a *Literature Oral Presentation* consisting of a summary and analysis of research articles. Student groups will be assigned a journal article by the guest lecturer/course convenor. The presentation should highlight the main research question, key result(s) and conclusions as well as implications for research translation. The presentation will be held using slides (power point or similar format) for the entire class during the seminar component of the course.

Marking consists of two components:

- Literature Oral Presentation: 15 marks (Group)
- Literature Oral Presentation – Peer Assessment: 5 marks (Individual)

The presentation is followed by a *Literature Discussion* about the topic of the presentation with participation from the entire class. Students in the audience ask questions, which are answered by the presenting group. Students in the audience record their contributions to the discussion in a personal journal, which will be submitted for assessment.

The presentation and subsequent class discussion will be moderated by the lecturer. Feedback will be provided by academics and peers.

Marking: 10 marks (Individual)

Project Assignment [20 marks]

Groups of students will be teamed up with a postgraduate student or postdoctoral researcher in the laboratories of lecturers. The group will be given a research question and will be tasked to design an experimental plan that can address this question. This is to be worked out in the team, whereby the students can discuss their ideas with the postgraduate student they are teamed up with. The group will then prepare a *Project Assignment* comprising of a poster of their proposed experiments. The posters should cover the following aspects: (1) Brief introduction/background to the research problem. (2) Experimental design, including choice of techniques. (3) Example data and discussion of how data should be analysed and interpreted. Detailed instruction will be provided during the course and example posters provided.

Marking consists of two components:

- Project Assignment (Group): 15 marks
- Project Assignment – Peer Assessment (Individual): 5 marks

Task	Due date	
(1) ePortfolio/reflective journal (50%)	Blog post	Comments
Infection & Immunity II (week 2)	08/06, 16:00	13/06, 10:00
Infection & Immunity III (week 3)	15/06, 16:00	20/06, 10:00
Cell- & Mechanobiology I (week 4)	22/06, 16:00	27/06, 10:00
Cell- & Mechanobiology II (week 5)	29/06, 16:00	04/07, 10:00
Cell- & Mechanobiology III (week 7)	13/07, 16:00	11/07, 10:00
Cancer I (week 8)	20/07, 16:00	18/07, 10:00
Cancer II (week 9)	27/07, 16:00	25/07, 10:00
Neurodegeneration (week 10)	03/08, 16:00	01/08, 10:00
(2) Literature Oral Presentation (20%)	to be allocated to groups	
(3) Literature Discussion (10%)	05/08/2022	
(4) Project Assignment (20%)	Can be submitted throughout the session, latest submission date: 05/08/2022	

Further information

UNSW grading system: <https://student.unsw.edu.au/grades>

UNSW assessment policy: <https://student.unsw.edu.au/assessment>

5.2 Assessment criteria and standards

ePortfolio/reflective journal

(1) Blog post: A concise answer directly addressing the questions is sufficient. The entry should correctly identify the key points or concepts and have a logical structure. Statements in the response should be referenced with a literature list provided at the end (at least three references, whereby reviews or research papers preferred over websites).

(2) Comments: At least three comments demonstrating learning, understanding of key concepts and revealing critical thinking. Comment can include a combination of

- reflection on one's own blog post (what do I view differently now that I have listened to the lecture) and answers to questions posted by others
- discussion or questions focusing on specific points from blog entries of peers

Literature Oral Presentations (Journal Club)

- CLARITY AND STRUCTURE: Oral presentation was clear, well-structured and illustrated and easily understood.
- TIMING: Appropriate weight given to different aspects within the allocated time frame.
- UNDERSTANDING: Students had a good understanding of the questions, experimental approaches and conclusions presented in the paper. Students were able to answer audience questions clearly.
- STIMULATED LEARNING: Presentation was interesting and highlighted key concepts, leading to a meaningful discussion of the advances and conclusion of the paper.
- CRITICAL THINKING: Students identified strengths and weaknesses in study design and interpretation.
- CONTRIBUTION: Peer marking for each member's contribution to the assessment task.

Project assignment

- CLARITY AND STRUCTURE: Poster was clear and had a logical structure guiding the reader through the question, experimental approaches, and interpretation. Design features for effective communication (including high quality figures). Concise but sufficient level of detail focused on key aspects.
- TECHNICAL EXPERTISE AND UNDERSTANDING: Clever choice of experimental approaches suitable to address the research question, revealing and understanding of the techniques, data analysis and interpretation.

5.3 Submission of assessment tasks

Late Submission

Late submissions will be penalized at 5% per day capped at five days (120 hours). Students will not be permitted to submit their assessments after this date.

Special Consideration

If you experience a short-term event beyond your control (exceptional circumstances) that impacts your performance in a particular assessment task, you can apply for Special Considerations.

You must apply for Special Consideration **before** the start of your exam or due date for your assessment, except where your circumstances of illness or misadventure stop you from doing so.

If your circumstances stop you from applying before your exam or assessment due date, you must **apply within 3 working days** of the assessment, or the period covered by your supporting documentation.

More information can be found on the [Special Consideration website](#).

5.4. Feedback on assessment

ePortfolio/reflective journal: Peers provide feedback via comments on blog posts. Lecturers provide written feedback as part of the assessment of weekly entries.

Literature Oral Presentation: Detailed oral feedback from peers and lecturers immediately after the presentation

Project assignment: Oral feedback during the second session of the negotiated lab visit. Written feedback provided by lecturers and markers at the end of the course.

6. Academic integrity, referencing and plagiarism

Referencing is a way of acknowledging the sources of information that you use to research your assignments. You need to provide a reference whenever you draw on someone else's words, ideas or research. Not referencing other people's work can constitute plagiarism. Please use Vancouver or APA referencing style for this course. Further information about referencing styles can be located at <https://student.unsw.edu.au/referencing>

Academic integrity is fundamental to success at university. Academic integrity can be defined as a commitment to six fundamental values in academic pursuits: honesty, trust, fairness, respect, responsibility and courage.¹ At UNSW, this means that your work must be your own, and others' ideas should be appropriately acknowledged. If you don't follow these rules, plagiarism may be detected in your work.

Further information about academic integrity and **plagiarism** can be located at:

- The Current Students site <https://student.unsw.edu.au/plagiarism>, and
- The ELISE training site <https://subjectguides.library.unsw.edu.au/elise>

The Conduct and Integrity Unit provides further resources to assist you to understand your conduct obligations as a student: <https://student.unsw.edu.au/conduct>.

7. Readings and resources

Provided on the course Moodle page.

8. Administrative matters

Student enquiries should be submitted via student portal <https://portal.insight.unsw.edu.au/web-forms/>

9. Additional support for students

- The Current Students Gateway: <https://student.unsw.edu.au/>
- Academic Skills and Support: <https://student.unsw.edu.au/academic-skills>
- Student Wellbeing and Health <https://www.student.unsw.edu.au/wellbeing>
- UNSW IT Service Centre: <https://www.myit.unsw.edu.au/services/students>

¹ International Center for Academic Integrity, 'The Fundamental Values of Academic Integrity', T. Fishman (ed), Clemson University, 2013.

- *UNSW Student Life Hub*: <https://student.unsw.edu.au/hub#main-content>
- *Student Support and Development*: <https://student.unsw.edu.au/support>
- *IT, eLearning and Apps*: <https://student.unsw.edu.au/elearning>
- *Student Support and Success Advisors*: <https://student.unsw.edu.au/advisors>
- *Equitable Learning Services (Formerly Disability Support Unit)*: <https://student.unsw.edu.au/els>
- *Transitioning to Online Learning* <https://www.covid19studyonline.unsw.edu.au/>
- *Guide to Online Study* <https://student.unsw.edu.au/online-study>