



# BIOL767

## Advanced Immunobiology

S2 External 2014

*Dept of Biological Sciences*

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## General Information

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Unit Convenor

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Credit points

4

Prerequisites

Admission to MRes

Corequisites

Co-badged status

NCCW Biol367

Unit description

This unit provides high level studies of the systems used by animals and plants to defend themselves from infection. The holistic approach taken in this unit allows us to identify the general themes that govern all immunological reactions. It also lets us dispel some myths that have governed mainstream immunology for decades. The biggest myth may turn out to be that only vertebrate animals, primarily mammals, are capable of sophisticated immune responses with the capacity to differentiate between different types of infectious agents. New evidence from throughout the animal and plant worlds suggests that this is not true, and there have been good reasons to be suspicious of this concept from the outset. So, in BIOL767, we don't use terms like "innate" and "adaptive" immune systems as you find them in textbooks because we think that they are outmoded. Instead, we describe immune responses in terms of three major phases that any defensive reaction must go through. These are: "recognition", where the presence of invaders is detected; "induction", where the responsive systems that combat invasion are activated; and "effect", where those responsive systems destroy or otherwise neutralise the invasive threat. Most of the unit will be spent describing those three phases, and the ways in which different animals and plants manage them.

## Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

## Learning Outcomes

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

Explain why all animals and plants need immune systems

Describe how the immune system contributes to the maintenance of homeostasis

Identify the cells and molecules in animals and plants that contribute to immune responses

Conceptualise immune systems in terms of three distinct process: recognition, induction and effect

Explain the integrated functions of different cells and molecules that are needed to produce a coordinated immune response

Prepare written and oral presentations based on evaluation of current scientific literature on topical issues in immunobiology

Carry out experiments using potentially hazardous material safely following Macquarie University sanctioned protocols

Collect experimental data accurately and analyse, graph and apply statistical methods to allow interpretation of the results

## Assessment Tasks

Name	Weighting	Due
<a href="#">Final examination</a>	50%	Exam Period
<a href="#">Midsemester test</a>	10%	TBA
<a href="#">Literature review</a>	15%	Oct 21
<a href="#">Seminar</a>	10%	TBA
<a href="#">Practical reports</a>	15%	Sept 2 & Oct 8

### Final examination

Due: **Exam Period**

Weighting: **50%**

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On successful completion you will be able to:

- Explain why all animals and plants need immune systems
- Describe how the immune system contributes to the maintenance of homeostasis
- Identify the cells and molecules in animals and plants that contribute to immune responses
- Conceptualise immune systems in terms of three distinct process: recognition, induction and effect
- Explain the integrated functions of different cells and molecules that are needed to produce a coordinated immune response

## Midsemester test

Due: **TBA**

Weighting: **10%**

Midsemester test will be comprised of multiple choice questions that are designed to assess your understanding in terms of both lecture material and practical classes.

On successful completion you will be able to:

- Explain why all animals and plants need immune systems
- Describe how the immune system contributes to the maintenance of homeostasis
- Identify the cells and molecules in animals and plants that contribute to immune responses
- Conceptualise immune systems in terms of three distinct process: recognition, induction and effect
- Explain the integrated functions of different cells and molecules that are needed to produce a coordinated immune response

## Literature review

Due: **Oct 21**

Weighting: **15%**

You will need to write a 2,000 word (excluding references and figures) literature review on the topic of your tutorial seminar

On successful completion you will be able to:

- Explain the integrated functions of different cells and molecules that are needed to produce a coordinated immune response
- Prepare written and oral presentations based on evaluation of current scientific literature on topical issues in immunobiology

## Seminar

Due: **TBA**

Weighting: **10%**

Groups of four students will prepare and present a short (20 minute) seminar on a selected topic.

On successful completion you will be able to:

- Explain the integrated functions of different cells and molecules that are needed to produce a coordinated immune response
- Prepare written and oral presentations based on evaluation of current scientific literature on topical issues in immunobiology

## Practical reports

Due: **Sept 2 & Oct 8**

Weighting: **15%**

You will be required to answer a series of questions based on each practical. Answers to these questions must be submitted to the Science Centre on 2 September (for the first 3 practicals) and 8 October (for the second set of practicals).

On successful completion you will be able to:

- Carry out experiments using potentially hazardous material safely following Macquarie University sanctioned protocols
- Collect experimental data accurately and analyse, graph and apply statistical methods to allow interpretation of the results

## Delivery and Resources

### CLASSES

- There are two weekly one hour lectures (W5A, T1 - Mon 9-10am, and E7B, T3 - Tues 2-3pm) The timetable for classes can be found on the University web site at: <https://timetables.mq.edu.au/2013/showtimetable.aspx>
- Practical content will be covered during two on campus sessions for external students:
  - Sat 24<sup>th</sup> and Sun 25<sup>th</sup> August from 9:00am until 4:00pm
  - and Mon 23<sup>rd</sup> to Wed 25<sup>th</sup> Sept from 9:00am until 4:00pm
- **Attendance at practical sessions is a compulsory component of this unit.**

## REQUIRED AND RECOMMENDED TEXTS AND/OR MATERIALS

- *Cellular and Molecular Immunology*, 7th Edition. Abul K. Abbas, Andrew H. Lichtman, and Shiv Pillai. Saunders Elsevier Publishing - this is an extremely comprehensive textbook with detailed information on most of the topics covered in lectures. Many images in the lecture graphics are taken from this book. This is the most recent (2012) edition, but previous editions should be OK.

When reading this textbook, you should remember that Biol367 takes a different approach to teaching immunobiology, and so does not refer to concepts such as "innate" and "adaptive" immunity. So if there are apparent contradictions in the textbook, always refer back to the lectures as a guide. The textbook provides access to the Elsevier Evolve Learning website, which provides additional material such as animations of key processes.

Lecture graphics will be available online on the unit website (via iLearn) prior to each lecture. There are 20 lectures in Biol367 covering the major topics of *recognition*, *induction* and *effect*. Each lecture has a series of learning objectives described in terms of Key Topics on the second slide of each lecture *Powerpoint* file. You will need to understand each of these key topics. The lecture graphics mainly use images from the textbook and from primary research articles and reviews. **The written text on the graphics is kept to a minimum and you will need to fill in the gaps with your own notes from the lectures** and, where necessary, from the textbook. The lecture series does not cover topics in the order in which they are presented in the textbook so that graphics for a single lecture may come from different chapters of the textbook.

## UNIT WEB PAGE

This unit operates as an online unit via iLearn. The website will contain lecture and practical class notes, and will be updated regularly with additional information and announcements. We encourage you to visit the website frequently to check for updates.

## Unit Schedule

WEEK	LECTURE	PRACTICAL
1	1. Introduction to unit 2. Summary of an immune response: recognition, induction and effect	

2	<p>3. Self and not-self: why do animals and plants need immune systems?</p> <p>4. Pathogens, parasites, competitors and symbionts</p>	
3	<p>5. Antigens and PAMPs: What defines not-self?</p> <p>6. Am I me, or not them? Recognition paradigms in plants and animals</p>	
4	<p>7. Pattern recognition molecules: lectins and Toll-like receptors</p> <p>8. Hypervariable recognition molecules I: New immune response gene families of invertebrates and plants</p>	
5	<p>9. Hypervariable recognition molecules II: Antibodies and t-cell receptors</p> <p>10. Danger, anti-viral states and inflammation</p>	
	<b>24 and 25 September - first on-campus session</b>	<p>1. Pattern recognition</p> <p>2. Antibody structure</p> <p>3. Phagolysosomal defence</p>
6	<p>11. Intracellular antigens, antigen processing and presentation</p> <p>12. Activation of T-cells by processed antigens</p>	
7		
	<b>23 to 25 September - second on-campus session</b>	<p>Mid semester test</p> <p>Seminars</p> <p>4. Proteolytic effector cascades I: Phenoloxidase</p> <p>5. Proteolytic effector cascades II: Complement</p> <p>6. Clinical Immunology: The Immunology of Pregnancy</p>
8	<p>13. Signalling, clonal selection and memory</p> <p>14. Autoreactivity and education: <i>To thine own self be true</i></p>	
9	<p>15. Plant defence I: R genes and AVR genes – the gene-for-gene model</p> <p>16. Plant defence II: systemic acquired resistance</p>	
10	<p>17. Effector cascades: complement and phenoloxidase</p> <p>18. Antimicrobial proteins</p>	
11	<p>19. The phagolysosomal system</p> <p>20. Synthesis</p>	
12	No lectures	

## Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](#). Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy [http://mq.edu.au/policy/docs/academic\\_honesty/policy.html](http://mq.edu.au/policy/docs/academic_honesty/policy.html)

Assessment Policy <http://mq.edu.au/policy/docs/assessment/policy.html>

Grading Policy <http://mq.edu.au/policy/docs/grading/policy.html>

Grade Appeal Policy <http://mq.edu.au/policy/docs/gradeappeal/policy.html>

Grievance Management Policy [http://mq.edu.au/policy/docs/grievance\\_management/policy.html](http://mq.edu.au/policy/docs/grievance_management/policy.html)

Disruption to Studies Policy [http://www.mq.edu.au/policy/docs/disruption\\_studies/policy.html](http://www.mq.edu.au/policy/docs/disruption_studies/policy.html) *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

In addition, a number of other policies can be found in the [Learning and Teaching Category](#) of Policy Central.

## Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: [https://students.mq.edu.au/support/student\\_conduct/](https://students.mq.edu.au/support/student_conduct/)

## Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

## Learning Skills

Learning Skills ([mq.edu.au/learningskills](http://mq.edu.au/learningskills)) provides academic writing resources and study strategies to improve your marks and take control of your study.

- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module for Students](#)
- [Ask a Learning Adviser](#)

## Student Services and Support

Students with a disability are encouraged to contact the [Disability Service](#) who can provide appropriate help with any issues that arise during their studies.



## Student Enquiries

For all student enquiries, visit Student Connect at [ask.mq.edu.au](http://ask.mq.edu.au)

## IT Help

For help with University computer systems and technology, visit <http://informatics.mq.edu.au/help/>.

When using the University's IT, you must adhere to the [Acceptable Use Policy](#). The policy applies to all who connect to the MQ network including students.