



# BIOL367

## Immunobiology

S2 Day 2015

*Dept of Biological Sciences*

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## General Information

Unit convenor and teaching staff

Unit Convenor

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Credit points

3

Prerequisites

(12cp in BIOL units at 200 or 300 level) or admission to GCertBiotech

Corequisites

Co-badged status

Unit description

This unit studies the relationship between infectious micro-organisms, and the animals and plants that they infect. The unit also focuses on the effects of environmental change on the ability of organisms to cope with disease. It begins by investigating the ecology of disease and the way it moulds the immune systems of plants and animals. We then describe the basic paradigms used by plants and animals to detect the presence of infectious agents and activate immune responses against them. The unit ends by discussing the key methods used by different organisms to kill pathogens and overcome infection. Throughout the unit we focus on systems that have direct relevance to medicine, agriculture or aquaculture, highlighting new discoveries that are changing the face of modern immunology.

## 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	Hurdle	Due
<u>Final examination</u>	50%	No	Exam Period
<u>Midsemester test</u>	10%	No	TBA
<u>Practical reports</u>	30%	No	One week after each prac class
<u>Seminar</u>	10%	No	TBA

### 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

## Practical reports

Due: **One week after each prac class**

Weighting: **30%**

You will be required to answer a series of questions based on each practical. Answers to these questions must be submitted in the week following the practical.

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

## 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

## Delivery and Resources

### Classes

- There are two weekly one hour lectures (Monday 9-10am, [E7B T4 Theatre](#), Friday 10-11am [E7B T4 Theatre](#)) and weekly 3 hour practical sessions (E8A150/130, 10am-1pm – 4pm Mon OR 2pm – 5pm Mon). The timetable for classes can be found on the University web site at: <https://timetables.mq.edu.au/2015/Reports/List.aspx>
- **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

### BIOL367, IMMUNBIOLOGY – TIMTABLE, 2015

WEEK	DATE	LECTURE	PRACTICAL
1		1. Introduction to unit	None
		2. Summary of an immune response: recognition, induction and effect	
2		3. Self and not-self: why do animals and plants need immune systems?	Introduction to practical classes
		4. Pathogens, parasites, competitors and symbionts	
3		5. Antigens and PAMPs: What defines not-self?	1: Pattern recognition
		6. Am I me, or not them? Recognition paradigms in plants and animals	
4		7. Pattern recognition molecules: lectins and Toll-like receptors	2: Antibody structure
		8. Hypervariable recognition molecules I: New immune response gene families of invertebrates and plants	
5		9. Hypervariable recognition molecules II: Antibodies and t-cell receptors	3: Phagolysosomal defence
		10. Danger, anti-viral states and inflammation	
6		11. Intracellular antigens, antigen processing and presentation	4: Proteolytic effector cascades I: Phenoloxidase
		12. Activation of T-cells by processed antigens	
7		Mid semester test	
		No lecture	

		Mid semester break (Sept 20 - Oct 6)	
8		No lecture, (Labour Day public holiday, Monday)	No practical classes (Labour Day public holiday, Monday)
		13. Signalling, clonal selection and memory	
9		14. Autoreactivity and education: <i>To thine own self be true</i>	5. Proteolytic effector cascades II: Complement
		15. Plant defence I: <i>R</i> genes and <i>AVR</i> genes – the gene-for-gene model – recorded only	
10		16. Plant defence II: systemic acquired resistance – recorded only	Seminars
		17. Effector cascades: complement and phenoloxidase	
11		18. Antimicrobial proteins	6: Clinical Immunology: The Immunology of Pregnancy
		19. The phagolysosomal system	
12		20. Synthesis	No pracs
		No lectures	

Task	Weight (%)	Due Date Internals	Due Date Externals	Linked Learning Outcomes	Linked Graduate Capabilities
Mid-semester Test	10	tba	tba	1,2,3,4,5	1,2
Seminars	10	tba	tba	5,6	2,4,5
Practical class reports	30	One week following practical classes	tba	7,8	1,2,3,4,5
Final Exam	50	exam period	exam period	1,2,3,4,5	1,2

## 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/)

## Results

Results shown in *iLearn*, or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit [ask.mq.edu.au](http://ask.mq.edu.au).

## 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.

## Graduate Capabilities

### Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

#### Learning outcome

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

#### Assessment tasks

- Practical reports
- Seminar

### Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

#### Learning outcomes

- Explain the integrated functions of different cells and molecules that are needed to produce a coordinated immune response
- Carry out experiments using potentially hazardous material safely following Macquarie University sanctioned protocols

## Assessment task

- Practical reports

## Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

## Learning outcomes

- 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

- Final examination
- Midsemester test
- Practical reports

## Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to

have a level of scientific and information technology literacy.

This graduate capability is supported by:

## **Learning outcomes**

- Explain why all animals and plants need immune systems
- Identify the cells and molecules in animals and plants that contribute to immune responses
- Collect experimental data accurately and analyse, graph and apply statistical methods to allow interpretation of the results

## **Assessment tasks**

- Final examination
- Midsemester test
- Practical reports
- Seminar

## **Problem Solving and Research Capability**

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

## **Learning outcomes**

- 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
- Prepare written and oral presentations based on evaluation of current scientific literature on topical issues in immunobiology
- Collect experimental data accurately and analyse, graph and apply statistical methods to allow interpretation of the results

## **Assessment task**

- Practical reports

## **Effective Communication**

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to

read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

## **Learning outcomes**

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

## **Assessment tasks**

- Practical reports
- Seminar