



BIOL364

Symbiosis in Health and Disease

S2 Day 2018

Dept of Biological Sciences

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General Information

Unit convenor and teaching staff

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Credit points

3

Prerequisites

39cp at 100 level or above including 9cp from BIOL units at 200 level or above

Corequisites

Co-badged status

Unit description

Symbiotic interactions underpin all biological systems. Symbiosis is defined as two (or more) species living together. Symbiotic interactions may be mutualistic, with both organisms benefiting from the partnership, or parasitic, where one of the partners is harmed. The association may be short-term or for the life of the organisms, with many symbiotic interactions essential for survival of the organisms. In this unit we explore diverse symbiotic partnerships spanning microbial, plant and animal taxa. We will investigate symbiosis in the context of biological roles and outcomes including health and disease of diverse taxa, co-evolution, and immunity. We will also address current issues of significance to symbiosis such as antibiotic resistance, emerging disease, ecosystem health and global change. Students who are interested in medical science, marine biology, conservation, evolution and ecology will enjoy this unit.

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:

- Differentiate key taxonomic groups of commensal, mutualistic and parasitic organisms
- Critique origins of endosymbiotic organelles
- Identify and differentiate symbiotic and pathogenic interactions

Identify trends which have moulded the evolution of pathogens and parasites
Design processes to test infection/transmission/virulence
Identify how interactions with other microbial communities affects disease susceptibility
Communicate human impacts on symbioses to stakeholders
Competently apply laboratory tests to detect disease agents

General Assessment Information

Assessment details

Details of assessments will be provided on iLearn and in class.

Assignment submission

All assignments will be digitally submitted through the appropriate Turnitin submission link on iLearn. An A3 printout of your poster is the only assessment that will be provided in hardcopy (and via Turnitin). All assessments need to be written in the students own words.

Academic honesty

All assessments need to be written in the students own words. The penalties imposed by the University for plagiarism are serious and may include expulsion from the University. ANY evidence of plagiarism WILL be dealt with following University policy. Penalties for plagiarism will be imposed for each assessment and clearly defined in marking guides. Further penalties imposed by the Faculty disciplinary committee may range from a loss of all marks and awarding of a zero depending on the circumstances.

Extensions, penalties and Disruptions to Studies

The deadlines for assignments are not negotiable. If an assignment is submitted late a penalty of -10% of the mark allocated for the assignment will be deducted per day that any work is submitted late (i.e. 5 days late = -50% of marks available).

If you experience a serious and unavoidable disruption to your studies and require an extension for an assessment please submit a Disruptions to Studies notification via ask.mq.edu.au with supporting documentation, and a Professional Authority Form completed by your health care professional. If you anticipate a potentially serious and unavoidable disruption (e.g. upcoming surgery) speak to the unit convenor early and apply for an extension before the due date.

Unit completion

To pass this unit students need to:

1. achieve an overall minimum grade of 50%,

2. attend a minimum of nine lectorial classes and nine practical classes is required . Note that the work undertaken in lectorial and practical classes form the basis of assessments, which cannot be completed without participation in relevant classes. A role will be taken for each class.
3. Complete of all hurdle assessments (online journal activities, practical skills and minimum performance in pre-lab quizzes) to a satisfactory level or defined mark, is required

Assessment Tasks

| Name | Weighting | Hurdle | Due |
|--|-----------|--------|---------------------|
| <u>Learning Journal</u> | 0% | Yes | Weeks 1-7 |
| <u>Exam (weeks 1-7)</u> | 15% | No | Week 8 lectorial |
| <u>Experimental protocol</u> | 20% | No | 9am October 2, 2018 |
| <u>Laboratory techniques quizzes</u> | 10% | Yes | Weeks 8-10 |
| <u>Practical skills</u> | 25% | Yes | weeks 10-11 |
| <u>One Health Day science fair</u> | 30% | No | November 3 |

Learning Journal

Due: **Weeks 1-7**

Weighting: **0%**

This is a hurdle assessment task (see [assessment policy](#) for more information on hurdle assessment tasks)

Completion of a series of tasks and activities associated with the weekly lectorial and practical sessions (weeks 1-7). These tasks will prepare you for lectorial activities and demonstrate laboratory competencies, some also report on lectorial outcomes.

Tasks are diverse and include reading and summarising concepts in papers and videos, answering questions and reflections. More information is detailed in instructions for these activities will be provided under weekly iLearn schedules and during weekly classes.

The online journal is a hurdle. You must complete all tasks to pass the unit. A serious attempt must be evident in your submission.

On successful completion you will be able to:

- Differentiate key taxonomic groups of commensal, mutualistic and parasitic organisms
- Critique origins of endosymbiotic organelles

- Identify and differentiate symbiotic and pathogenic interactions
- Identify how interactions with other microbial communities affects disease susceptibility

Exam (weeks 1-7)

Due: **Week 8** lectorial

Weighting: **15%**

An examination covering lecture and lectorial material from weeks 1-7 will be held in lectorial classes during week 8 (after mid-session break) or OCS 2. The exam will comprise multiple choice and short answer questions.

On successful completion you will be able to:

- Differentiate key taxonomic groups of commensal, mutualistic and parasitic organisms
- Critique origins of endosymbiotic organelles
- Identify and differentiate symbiotic and pathogenic interactions
- Identify trends which have moulded the evolution of pathogens and parasites

Experimental protocol

Due: **9am October 2, 2018**

Weighting: **20%**

In the first major practical task (Grow your own nodules) you examined the symbiotic associated between legumes and soil bacteria belonging to the Alpha-Proteobacteria e.g. *Rhizobium*. For this assessment you need to design a follow-up experiment to test the host specificity of *Rhizobium* and to demonstrate that *Rhizobium* are integral to the development of the nodules. You will need to develop hypotheses, predictions, brief experimental protocol and define what data will be collected. We will provide a template for this assessment.

On successful completion you will be able to:

- Identify and differentiate symbiotic and pathogenic interactions
- Identify trends which have moulded the evolution of pathogens and parasites
- Design processes to test infection/transmission/virulence
- Competently apply laboratory tests to detect disease agents

Laboratory techniques quizzes

Due: **Weeks 8-10**

Weighting: **10%**

This is a hurdle assessment task (see [assessment policy](#) for more information on hurdle assessment tasks)

There will be two online quizzes that will test your understanding of the skills you will apply in practical classes associated with molecular methods.

The quizzes must be completed before you attend the practical and a mark of 65% must be achieved (you will get two attempts). The aim is for you to demonstrate that you understand the processes you are applying in the practical class. If you do not complete or pass the quiz you will not be able to participate in the practical class.

On successful completion you will be able to:

- Competently apply laboratory tests to detect disease agents

Practical skills

Due: **weeks 10-11**

Weighting: **25%**

This is a hurdle assessment task (see [assessment policy](#) for more information on hurdle assessment tasks)

Assessed during practical classes in weeks 8-10 on ability to execute lab skills for DNA extraction and PCR. These activities require attention to detail, correct and precise pipetting skills, and ability to follow long protocols correctly. We will test you on these skills in the practical class as you perform each. A checklist of the various aspects that we will assess will be provided. You must obtain a 50% mark in these skills to pass the unit.

On successful completion you will be able to:

- Competently apply laboratory tests to detect disease agents

One Health Day science fair

Due: **November 3**

Weighting: **30%**

The culmination of the second half of the session and work you have done across the unit on antibiotic resistance will end with a science fair showcasing issues of antibiotic resistance to the University community. This activity will be registered as Global One Health Event: https://www.onehealthcommission.org/en/events/one_health_day/ and will occur the week before Antibiotic Awareness Week 12-18 November, 2018

In a small group you will need to identify activities to showcase an issue of antibiotic resistance. We will decide as a class, if you would like to make a general approach to the topic or a specific theme. As part of the process you will need to

1. Interview people to gauge their knowledge of the issue (individual work).
2. Develop an activity as a group. Time will be allocated in lectorials as well as your outside of class study time (group work).
3. Deliver activity in one of two sessions on Tuesday November 3, in the Biology Courtyard (group work).
4. Reflective report - outcome of interviews and reflection on group activity ((individual work)

On successful completion you will be able to:

- Identify and differentiate symbiotic and pathogenic interactions
- Identify trends which have moulded the evolution of pathogens and parasites
- Identify how interactions with other microbial communities affects disease susceptibility
- Communicate human impacts on symbioses to stakeholders

Delivery and Resources

DELIVERY

BIOL364 is divided into themes and material presented in weekly lectures, lectorials and practical classes complement weekly themes.

Lectures

Weekly lectures provide broad overviews to the topics that we explore each week. The lecture material complements material presented in practical classes and lectorials. To ensure that your performance and understanding of material on practicals and lectorials is optimal, we expect you to attend the lectures or listen to them before the lectorial and practical classes of the same week.

Lectorials

Weekly lectorials delve deeper into the weekly unit themes. Lectorials comprise mini-lectures that are accompanied by small group tasks. Activities in the lectorial form the basis of content for your learning journal assessment.

Practical classes

There are three major practical themes that will be covered in BIOL364. Practical classes will run for several weeks. Some material required for the learning journal will be gathered in practical classes and major assessments are based on practical activities.

Dress for laboratory sessions

- You must wear sturdy shoes that cover your feet.
- You must wear a lab coat in every practical to protect your clothes.
- You MUST bring your own lab coat to every class. We will no longer provide disposable lab coats as these are not environmentally friendly.
- Although the material that we will use has been rendered non-infectious good laboratory practice of wearing protective clothing when working with organisms that potentially cause disease is required. ALWAYS wash hands before leaving laboratory.
- **PLEASE NOTE**
 - **NO COAT = NO CLASS**
 - **Inappropriate shoes = no laboratory access**

RESOURCES

There are no required text books for BIOL364 Symbiosis in Health and Disease. we will provide references to many research papers that will assist with weekly unit themes.

Unit Schedule

| Week | Date | Weekly topic | Practical topic |
|------|--------|-------------------------------------|------------------------------------|
| 1 | Jul 30 | Introduction; Spectrum of symbiosis | |
| 2 | Aug 6 | Bacteria / Bacteria interactions | Introduction, WHS, skills revision |
| 3 | Aug 13 | Animal plant interactions | Spectrum of Symbiosis |
| 4 | Aug 20 | Microbe-plant interactions | Grow your own nodules Ia |
| 5 | Aug 27 | Microbe - animal interactions | Grow your own nodules Ib |
| 6 | Sept 3 | Parasitism | Grow your own nodules II |
| 7 | Sept 9 | Epidemiology | Parasites in Tasmanian devils |
| | Recess | | |
| 8 | Oct 1 | Co-evolution | public holiday |
| 9 | Oct 7 | Human infectious diseases | Scoop a poop 1 |
| 10 | Oct 15 | Antibiotic resistance | Scoop a poop 2 |
| 11 | Oct 22 | Virulence | Scoop a poop 3 |
| 12 | Oct 29 | Summary | Prep towards science fair |
| 13 | Nov 3 | One Health Science fair | Science fair |
| | | | |

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central\)](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)

- [Academic Progression Policy](#)
- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Grade Appeal Policy](#)
- [Complaint Management Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#) (**Note:** *The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.*)

Undergraduate students seeking more policy resources can visit the [Student Policy Gateway](https://students.mq.edu.au/support/study/student-policy-gateway) (<https://students.mq.edu.au/support/study/student-policy-gateway>). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit [Policy Central](http://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central) (<http://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/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/study/getting-started/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.

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) 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

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources 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 outcomes

- Design processes to test infection/transmission/virulence
- Communicate human impacts on symbioses to stakeholders

Assessment tasks

- Learning Journal
- Experimental protocol
- One Health Day science fair

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 outcome

- Communicate human impacts on symbioses to stakeholders

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

- Differentiate key taxonomic groups of commensal, mutualistic and parasitic organisms
- Critique origins of endosymbiotic organelles
- Identify and differentiate symbiotic and pathogenic interactions
- Identify trends which have moulded the evolution of pathogens and parasites
- Design processes to test infection/transmission/virulence
- Identify how interactions with other microbial communities affects disease susceptibility
- Competently apply laboratory tests to detect disease agents

Assessment tasks

- Learning Journal
- Exam (weeks 1-7)
- Experimental protocol
- Laboratory techniques quizzes
- Practical skills
- One Health Day science fair

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

- Differentiate key taxonomic groups of commensal, mutualistic and parasitic organisms
- Identify and differentiate symbiotic and pathogenic interactions
- Identify trends which have moulded the evolution of pathogens and parasites
- Design processes to test infection/transmission/virulence
- Identify how interactions with other microbial communities affects disease susceptibility
- Competently apply laboratory tests to detect disease agents

Assessment tasks

- Learning Journal
- Exam (weeks 1-7)
- Experimental protocol
- Practical skills

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

- Design processes to test infection/transmission/virulence
- Competently apply laboratory tests to detect disease agents

Assessment tasks

- Learning Journal
- Experimental protocol

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

- Critique origins of endosymbiotic organelles
- Design processes to test infection/transmission/virulence
- Communicate human impacts on symbioses to stakeholders

Assessment tasks

- Learning Journal
- Exam (weeks 1-7)
- Experimental protocol

- One Health Day science fair

Engaged and Ethical Local and Global citizens

As local citizens our graduates will be aware of indigenous perspectives and of the nation's historical context. They will be engaged with the challenges of contemporary society and with knowledge and ideas. We want our graduates to have respect for diversity, to be open-minded, sensitive to others and inclusive, and to be open to other cultures and perspectives: they should have a level of cultural literacy. Our graduates should be aware of disadvantage and social justice, and be willing to participate to help create a wiser and better society.

This graduate capability is supported by:

Learning outcome

- Communicate human impacts on symbioses to stakeholders

Assessment task

- One Health Day science fair

Socially and Environmentally Active and Responsible

We want our graduates to be aware of and have respect for self and others; to be able to work with others as a leader and a team player; to have a sense of connectedness with others and country; and to have a sense of mutual obligation. Our graduates should be informed and active participants in moving society towards sustainability.

This graduate capability is supported by:

Learning outcome

- Communicate human impacts on symbioses to stakeholders

Assessment task

- One Health Day science fair

Changes from Previous Offering

BIOL364 Symbiosis in Health and Disease was offered for the first time in 2017. In 2018 there have been a number of changes to better reflect the unit learning outcomes and

1. The online journal is now a hurdle and completion of activities is required to participate in lectorial classes
2. Assessments have been altered with replacement of the poster and industry report with new activities (Science Fair and exam)
3. As the practical aspects are a large part of the course we have now integrated assessments based on competency in laboratory skills (25%) and prac methods understanding (10%).

Changes since First Published

| Date | Description |
|------------|---|
| 11/07/2018 | The exam date was changed from week 7 to 8. |
| 09/07/2018 | The requirement to bring a lab coat to practical classes was added. |