



MOLS7012

Research Topic: Synthetic Biology

Session 1, Weekday attendance, North Ryde 2021

Archive (Pre-2022) - Department of Molecular Sciences

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Notice

As part of [Phase 3 of our return to campus plan](#), most units will now run tutorials, seminars and other small group activities on campus, and most will keep an online version available to those students unable to return or those who choose to continue their studies online.

To check the availability of face-to-face activities for your unit, please go to [timetable viewer](#). To check detailed information on unit assessments visit your unit's iLearn space or consult your unit convenor.

General Information

Unit convenor and teaching staff

Paul Jaschke

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Credit points

10

Prerequisites

Admission to MRes

Corequisites

Co-badged status

Unit description

This unit will build on fundamental concepts in molecular biology and bioengineering to explore themes in the emerging field of synthetic biology. This unit will provide students with the conceptual framework of systematic molecular design in order to build new componentry and biological systems. The unit will be taught extensively through the primary literature and will provide students with hands on experience in cutting edge tools required to design and synthesize biological parts. Exemplars of current applications including generation of biofuels, microbial synthesis of pharmaceuticals, and design of biosensors to detect infection and environmental waste will be examined. This unit will also focus on the ethical, legal and societal issues surrounding synthetic biology.

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:

ULO1: Summarise and discuss engineering principles and the relationship to synthetic biology. Gain familiarity with a common vocabulary useful for synthetic biology (e.g. standard part, chassis, switches, oscillators, etc.)

ULO2: Summarise current and future application spaces for synthetic biology and have a sound knowledge of the latest published literature in the field

ULO3: Define the culture, safety practices, and organisational community of the synthetic biology field to evaluate how emerging and future synthetic biology

technologies may benefit and/or potentially endanger humanity and the natural environment

ULO4: Productively work in a group on a scientific project

ULO5: Synthesize diverse primary synthetic biology literature sources and present in an accessible way suitable for a general audience

General Assessment Information

Assessment due dates will be posted on iLearn.

There is a late penalty of 10% per 24-hour period for handing in assessments after the due date.

Assessment Tasks

Name	Weighting	Hurdle	Due
<u>SynBio Company Assessment</u>	18%	No	Week 3
<u>Paper presentation/discussion</u>	18%	No	Weeks 4-6
<u>SynBio Ethics Essay</u>	18%	No	Week 7
<u>Gene refactoring</u>	18%	No	Week 13
<u>Digital Media Presentation</u>	28%	No	Week 13

SynBio Company Assessment

Assessment Type ¹: Presentation

Indicative Time on Task ²: 17 hours

Due: **Week 3**

Weighting: **18%**

Presentation describing one company in the synthetic biology space

On successful completion you will be able to:

- Summarise and discuss engineering principles and the relationship to synthetic biology. Gain familiarity with a common vocabulary useful for synthetic biology (e.g. standard part, chassis, switches, oscillators, etc.)
- Define the culture, safety practices, and organisational community of the synthetic biology field to evaluate how emerging and future synthetic biology technologies may benefit and/or potentially endanger humanity and the natural environment
- Synthesize diverse primary synthetic biology literature sources and present in an accessible way suitable for a general audience

Paper presentation/discussion

Assessment Type ¹: Presentation

Indicative Time on Task ²: 17 hours

Due: **Weeks 4-6**

Weighting: **18%**

Lead presentation of primary synthetic biology literature and participate in discussion of other student presentations

On successful completion you will be able to:

- Summarise and discuss engineering principles and the relationship to synthetic biology. Gain familiarity with a common vocabulary useful for synthetic biology (e.g. standard part, chassis, switches, oscillators, etc.)
- Productively work in a group on a scientific project
- Synthesize diverse primary synthetic biology literature sources and present in an accessible way suitable for a general audience

SynBio Ethics Essay

Assessment Type ¹: Essay

Indicative Time on Task ²: 17 hours

Due: **Week 7**

Weighting: **18%**

An essay on the ethics of synthetic biology

On successful completion you will be able to:

- Summarise current and future application spaces for synthetic biology and have a sound knowledge of the latest published literature in the field
- Define the culture, safety practices, and organisational community of the synthetic biology field to evaluate how emerging and future synthetic biology technologies may benefit and/or potentially endanger humanity and the natural environment
- Synthesize diverse primary synthetic biology literature sources and present in an accessible way suitable for a general audience

Gene refactoring

Assessment Type ¹: Design Task

Indicative Time on Task ²: 17 hours

Due: **Week 13**

Weighting: **18%**

Redesign (refactoring) of a set of genes for expression in an alternate host.

On successful completion you will be able to:

- Productively work in a group on a scientific project

Digital Media Presentation

Assessment Type ¹: Media presentation

Indicative Time on Task ²: 24 hours

Due: **Week 13**

Weighting: **28%**

Digital media presentation of a tool, method, and/or approach in synthetic biology aimed at general audience.

On successful completion you will be able to:

- Summarise and discuss engineering principles and the relationship to synthetic biology. Gain familiarity with a common vocabulary useful for synthetic biology (e.g. standard part, chassis, switches, oscillators, etc.)
- Summarise current and future application spaces for synthetic biology and have a sound knowledge of the latest published literature in the field
- Synthesize diverse primary synthetic biology literature sources and present in an accessible way suitable for a general audience

¹ If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the [Writing Centre](#) for academic skills support.

² Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

Delivery and Resources

Class Times:

This Session 1 unit comprises a 4-hour block each week. Please consult the iLearn site for updated timetable. This unit will be taught as tutorials that encompass both lectures and hands-on experiences/workshop activities (e.g. discussion of relevant papers from literature; software workshops etc). Tutorials will NOT be recorded and attendance is compulsory.

Unit Text:

The following text is recommended to help with your learning in this unit. "Synthetic Biology :

Tools and Applications” (2013) Huimin Zhao.

The ebook can be downloaded from the library using this link: <http://mqu.ebib.com.au/patron/FullRecord.aspx?p=1160900>

There is a hardcopy of the book in the Macquarie Library. It is NOT recommended that you purchase this text.

Other required learning material (e.g. journal articles, book chapters) will be made available on iLearn as this unit progresses.

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au). 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](#)

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

To find other policies relating to Teaching and Learning, visit [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au) and use the [search tool](#).

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/admin/other-resources/student-conduct>

Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) 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 or if you are a Global MBA student contact globalmba.support@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 help you improve your marks and take control of your study.

- [Getting help with your assignment](#)
- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module](#)

The Library provides online and face to face support to help you find and use relevant information resources.

- [Subject and Research Guides](#)
- [Ask a Librarian](#)

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

If you are a Global MBA student contact globalmba.support@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.