



# MOLS8411

## Molecular Genomics Analysis and Design

Session 1, Weekday attendance, North Ryde 2021

*Archive (Pre-2022) - Department of Molecular Sciences*

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#### **Disclaimer**

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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

((BMOL6201 or CBMS621) or (admission to MBioBus or BMedScMBiotech)) and BMOL6432

Corequisites

Co-badged status

Unit description

This unit provides an introduction to synthetic biology and hands-on practise in the analysis of large datasets gathered when working in the broad field of biomolecular sciences.

Biomolecular sciences spans the study of individual molecular structures and biochemical reactions to also encompass the 'omics' sciences of genomics, proteomics, metabolomics and glycomics. These sciences all generate large and complex datasets that require specialised software and methods to assemble and analyse. The analyses are challenging, as they not only require a good knowledge of biochemistry, molecular biology, and cell and developmental biology, but also an understanding of limitations of both the software and the data quality. The lectures on synthetic biology start with a brief overview of the field before delving into more challenging yet exciting concepts. You will learn about current techniques and approaches used in synthetic biology and design a molecular switch using these principles. The lectures also discuss applications, limitations and future potential of synthetic biology to produce new solutions to global challenges.

## 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:** Utilise and describe techniques applicable to acquiring large biomolecular datasets and the limitations of the use of these methods

**ULO2:** Design and conduct experiments to collect large biomolecular datasets using

appropriate methods to assess and analyse the quality of these datasets.

**ULO3:** Report, communicate and draw new conclusions about a biomolecular system from large analytical datasets

**ULO4:** Summarise and discuss synthetic biology engineering principles using appropriate contemporary synthetic biological vocabulary

**ULO5:** Summarise current and future application spaces for synthetic biology by reviewing the latest published literature in the field

**ULO6:** 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

## General Assessment Information

All assignments must be submitted as soft copy before the date & time specified on iLearn. Specific instructions for how to successfully complete assessments will be provided on iLearn. Criteria and standards required for the assessment tasks will be available on iLearn.

Students unable to attend classes due to illness or misadventure (as defined in the Handbook of Undergraduate Studies) should complete a "[Special Consideration](#)" request as soon as possible, giving details of exact assessment task missed (e.g. Workshop 1.2 or Assessment #3). Failure to specify which assessment or workshop the request pertains to may result in delay or denial of special consideration.

Students may receive an extension; the average mark from the sessions that they did attend; may be given alternate assessment tasks or simply be marked absent. For any unapproved absences, students will receive a zero mark. Spot tests do not require a formal ask request as only the top 10 attempts will be counted.

Late submission will receive a 10% per 24-hour period penalty.

Participation in ALL workshop sessions is required in order to complete the workshop reports.

## Assessment Tasks

Name	Weighting	Hurdle	Due
<a href="#">Workshop Participation</a>	0%	Yes	Ongoing
<a href="#">Natural and Synthetic Genomics Essay</a>	25%	No	Week 7
<a href="#">Genome assembly and annotation</a>	25%	No	Week 9
<a href="#">Synthetic Biology Design Project</a>	25%	No	Week 13

Name	Weighting	Hurdle	Due
<a href="#">Final Exam</a>	25%	No	University Examination Period

## Workshop Participation

Assessment Type <sup>1</sup>: Participatory task

Indicative Time on Task <sup>2</sup>: 0 hours

Due: **Ongoing**

Weighting: **0%**

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

Based on attending workshops, contributing to discussions, and completing activities.

On successful completion you will be able to:

- Utilise and describe techniques applicable to acquiring large biomolecular datasets and the limitations of the use of these methods
- Design and conduct experiments to collect large biomolecular datasets using appropriate methods to assess and analyse the quality of these datasets.
- Report, communicate and draw new conclusions about a biomolecular system from large analytical datasets
- Summarise and discuss synthetic biology engineering principles using appropriate contemporary synthetic biological vocabulary
- Summarise current and future application spaces for synthetic biology by reviewing 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

## Natural and Synthetic Genomics Essay

Assessment Type <sup>1</sup>: Essay

Indicative Time on Task <sup>2</sup>: 22 hours

Due: **Week 7**

Weighting: **25%**

An essay on a contemporary topic in genomics and/or synthetic biology.

On successful completion you will be able to:

- Utilise and describe techniques applicable to acquiring large biomolecular datasets and the limitations of the use of these methods
- Report, communicate and draw new conclusions about a biomolecular system from large analytical datasets
- Summarise and discuss synthetic biology engineering principles using appropriate contemporary synthetic biological vocabulary
- 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

## Genome assembly and annotation

Assessment Type <sup>1</sup>: Poster

Indicative Time on Task <sup>2</sup>: 22 hours

Due: **Week 9**

Weighting: **25%**

Presentation of a poster representing a genome assembly and annotation project.

On successful completion you will be able to:

- Utilise and describe techniques applicable to acquiring large biomolecular datasets and the limitations of the use of these methods
- Design and conduct experiments to collect large biomolecular datasets using appropriate methods to assess and analyse the quality of these datasets.
- Report, communicate and draw new conclusions about a biomolecular system from large analytical datasets

## Synthetic Biology Design Project

Assessment Type <sup>1</sup>: Presentation

Indicative Time on Task <sup>2</sup>: 25 hours

Due: **Week 13**

Weighting: **25%**

A presentation on a synthetic biology design task.

On successful completion you will be able to:

- Summarise and discuss synthetic biology engineering principles using appropriate contemporary synthetic biological vocabulary
- Summarise current and future application spaces for synthetic biology by reviewing 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

## Final Exam

Assessment Type <sup>1</sup>: Examination

Indicative Time on Task <sup>2</sup>: 20 hours

Due: **University Examination Period**

Weighting: **25%**

An exam consisting of a series of problem solving, data interpretation and short essay questions.

On successful completion you will be able to:

- Utilise and describe techniques applicable to acquiring large biomolecular datasets and the limitations of the use of these methods
- Design and conduct experiments to collect large biomolecular datasets using appropriate methods to assess and analyse the quality of these datasets.
- Report, communicate and draw new conclusions about a biomolecular system from large analytical datasets
- Summarise and discuss synthetic biology engineering principles using appropriate contemporary synthetic biological vocabulary

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<sup>1</sup> 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.

<sup>2</sup> 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

### Lectures

Mondays: 1 pm - 2 pm (via Zoom)

Zoom link: <https://macquarie.zoom.us/j/85099396615>

(note: lectures are recorded and as a participant you may be recorded in this process)

Lectures will be presented formally, although quizzes and general questions may be asked in class, to strengthen and increase understanding of the concepts. Most lecture material will be available on the unit web site, while other material will be provided in the lecture class. Do not assume these notes or recordings/video capture are a suitable substitute to attending the lectures. As a rule of thumb, you should spend 1-2 hours studying the lecture material for every hour spent attending lecture.

### Workshops

Starting **Week 2** of semester.

14 Eastern Road (14EAR also known as E8A) - 130/150 Science Lab

Fridays: 9 am - 1 pm

The demonstrators are actively involved in research activities to bring knowledge from real-world experiences in their respective fields. You must attend these workshops to gain practical experience with data analysis and designing of the switch. As some of the assessment is based on your practical use of specific software it is essential that you attend these workshops.

It is recommended that each student will bring to workshop a laptop computer to install data analysis software, or prior arrangements must be made with the convenor.

### Required Reading for Book Review Assessment:

To purchase the book Biocode (ISBN: 9780199687763), it is available from Booktopia:

<https://www.booktopia.com.au/biocode-dawn-field/book/9780199687763.html>

## 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](https://ask.mq.edu.au) or if you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto: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](https://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](http://ask.mq.edu.au)

If you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto: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/](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.