MOLS8411

Molecular Genomics Analysis and Design

Session 1, Weekday attendance, North Ryde 2020

Department of Molecular Sciences

Contents

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General Information

Unit convenor and teaching staff Paul Jaschke paul.jaschke@mq.edu.au
Credit points 10
Prerequisites (Admission to MBioBus or GradDipBiotech or MBiotech or MConsBiol or GradDipMarScMgt or MMarScMgt or MRadiopharmSc or MSc or MScInnovationChemBiomolecularSc) and (BMOL6201 or CBMS621) 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:** Ultilise 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

Assessment Tasks

Coronavirus (COVID-19) Update

Assessment details are no longer provided here as a result of changes due to the Coronavirus (COVID-19) pandemic.

Students should consult iLearn for revised unit information.

Find out more about the Coronavirus (COVID-19) and potential impacts on staff and students

General Assessment Information

1. Assignments

All assignments must be submitted as soft copy before the date & time specified on iLearn. All written work must be submitted to Turnitin for plagiarism checking. Instructions will be provided on iLearn. Criteria and standards required for the assessment tasks will be available on iLearn.

2. 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. Prac 1, Tutorial 2). 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.

3. Late submission will receive a 10% per day penalty and will not be marked if more than 1 week late.

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

Delivery and Resources

Coronavirus (COVID-19) Update

Any references to on-campus delivery below may no longer be relevant due to COVID-19.

Please check here for updated delivery information: https://ask.mq.edu.au/account/pub/display/unit_status

This unit uses team-based teaching and workshops. The material relating to data analysis and synthetic biology encompasses both lectures and hands-on experience in the use of various data analysis software programs and tools. 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. You are expected to download the lecture material and bring it into the lecture class so you can spend most of the time listening to the lecturer rather than transcribing. Do not assume these notes or recordings/video capture are a suitable substitute to attending the lectures.

The demonstrators are actively involved in research activities to bring knowledge from real-world experiences in their respective fields. Workshops will NOT be recorded. 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 class a laptop PC computer to install data analysis software, or prior arrangements must be made with the convenor.

Software Requirements

Genomics, data analysis and programming software used in this module can either be installed onto the students' laptop or will be made available via access to a university Linux server. Local installation of up-to-date versions of the following software will be required.

• Qiime2 (Installed for lab computers)

• R (https://www.r-project.org)

• RStudio (https://www.rstudio.com/products/rstudio/download/)

• Mobaxterm (Windows) (https://mobaxterm.mobatek.net)

All official correspondence with lecturers and tutors will be carried out using the MOLS8411 iLearn website.

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-centr

al). 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.)*

Students seeking more policy resources can visit the 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 (https://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 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.