BMOL3402

Molecular Biology and Genomics

Session 1, Weekday attendance, North Ryde 2020

Department of Molecular Sciences

Contents

General Information

Unit convenor and teaching staff
Distinguished Professor
Ian Paulsen
ian.paulsen@mq.edu.au
Contact via 9850 8152
14 Eastern Road Room 202

Professor
Paul Haynes
paul.haynes@mq.edu.au
Contact via 9850 6258
Room 309 6 Wally's Walk

Senior Technical Officer
Ray Duell
ray.duell@mq.edu.au
Contact via 9850 8184
Room 103 14 Eastern Road

Credit points
10

Prerequisites
BMOL2201 or CBMS201 or CBMS223

Corequisites

Co-badged status
This unit is co-badged with BMOL 6432 ie BMOL3402/6432

Unit description
Molecular biology is a central science in twenty-first century biology and biotechnology. Understanding the fundamentals of molecular biology is essential for many other fields in the life sciences, including microbiology, cell biology, immunology, and development. Molecular biology makes a significant and increasing contribution to major sectors of our society including agriculture and medicine, and is also important in environmental science and forensics. In this unit we explore topics that allow students to obtain an advanced understanding of the mechanisms of molecular biology, including those of DNA replication and recombination, prokaryotic gene expression, eukaryotic gene expression, mobile elements, the functions of the nucleus, and epigenetics. We also address topics on the rapidly changing technologies in molecular biology, including those used in genome sequencing, metagenomics, systems and synthetic biology. Practical sessions complement the lectures and provide students with hands-on experience with a range of critical laboratory skills including those required for DNA and RNA isolation, PCR and RT-PCR, cloning, and bioinformatics. Students gain experience in working with both bacterial and eukaryotic systems in the laboratory classes so that their skills and experience are valuable for a variety of positions in both industry and research.

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: Describe the theory behind and demonstrate competency in the use of a range of molecular biology experimental techniques, including PCR, restriction enzyme digestion, gel electrophoresis, cloning, site-directed mutagenesis, DNA sequencing and DNA hybridization.

ULO2: Describe and discuss essential molecular processes in the cell, especially as related to DNA and RNA. These molecular processes include transcription, translation, DNA replication, recombination, DNA repair, and transposition.

ULO3: Relate the revolutionary impact of genomics across all biological sciences.

ULO4: Analyse and interpret experimental data and present this in a structured report utilising appropriate scientific referencing.

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

Assignments

- **All assignments must be submitted as soft copy on the date specified.**
- **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.**

Extensions will only be granted under exceptional circumstances.

There will be a deduction of 10% of the total available marks made from the total awarded mark for each 24 hour period or part thereof that the submission is late (for example, 25 hours late in submission – 20% penalty). This penalty does not apply for cases in which an application for disruption of studies is made and approved.

Problem Set

Problems 1 - 12 should be done in time for marking and discussion during the practical session of the **Week 12**.

Requirements

Assessment tasks involve the practical assignments and the problem sets which are both integral components of the unit. Apart from the marks formally allocated to these components, a comprehensive understanding of them will greatly assist you in the final exam. You should remember that the final exam covers **ALL** components of the unit.

Participation in ALL practical sessions is required in order to complete the practical 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

Classes There are two weekly lectures of one hour each on Monday and Wednesday. Details: **Mon 12-1 pm** at **14 Sir Christopher Ondaatje Ave - T5 Theatre** and **Wed 3-4 pm** at **14 Sir Christopher Ondaatje Ave - T2 Theatre**. There is one weekly practical session of three hours on **Monday 2 - 5 pm** (practical groups 1 and 2) and **Tuesday 10 am - 1 pm** (practical group 3) at **14 Eastern Road E8A science labs 130 and 150**. In weeks 9 to 11, the practical class includes a bioinformatic workshop in the same location. Attendance at practical sessions (and bioinformatic workshop) is a compulsory component of this unit. Lecture recordings and graphics slides are available online through iLearn (https://ilearn.mq.edu.au/login/MQ/), although lecture attendance in person is highly recommended. The practical manual is also available online through iLearn.

Required and Recommended Texts The course syllabus is defined by all of the subject material presented in lectures and practicals, much of which is beyond standard textbooks. The prescribed text for this unit is Molecular Biology Fifth edition by Robert F Weaver. Available from the Co-op bookshop. The following texts may also be useful and are available in the library:

GenesIX by Benjamin Lewin

Mobile Genetic Elements by Sherratt

Molecular Cloning: A Laboratory Manual by Maniatis, Fritsch and Sambrook

An Introduction to Genetic Engineering by Des Nicholl.

Technology Requirements Within this Unit, you will be introduced to web-based search engines that are commonly used in molecular biology. Our expectation is that you will be able to readily access the internet and have a computer available to you for web browsing and preparation of your laboratory reports. Handwritten reports will not be accepted. Your laboratory reports will be submitted and circulated via the online Turnitin program, for which access instructions will be given at submission time. Your practical reports will require you to carry out minor computational tasks, for which a calculator and access to basic statistical tools will be required. We place a large emphasis on correct referencing style in all your reports, and use of the program EndNote is encouraged, but not essential.

Unit Schedule

Coronavirus (COVID-19) Update

The unit schedule/topics and any references to on-campus delivery below may no longer be relevant due to COVID-19. Please consult iLearn for latest details, and check here for updated delivery information: https://ask.mq.edu.au/account/pub/display/unit_status

Week	Lecture	Title	Lecturer
1	1	Introduction/What is Molecular Biology/Genome Structure	Haynes
	2	Gene Organization/function	Haynes
2	3	Molecular Biology Techniques	Haynes
	4	Molecular Biology Techniques	Paulsen
3	5	Molecular Cloning	Haynes
	6	Tools for studying Gene Activity	Haynes
4	7	Transcription in Prokaryotes	Paulsen
	8	Structure of Prokaryotic Operons	Paulsen
5	9	Bacterial Gene Regulation	Paulsen
	10	Transcription in Eukaryotes	Paulsen
6	11	Eukaryotic Gene Regulation	Paulsen
	12	Nucleosomes/Histones/Chromatin	Paulsen
7	13	Messenger RNA splicing	Paulsen
	14	Mechanism of Translation	Paulsen
		SEMESTER BREAK	
8	15	Ribosomes and transfer RNA	Paulsen
	16	DNA replication	Paulsen
9	17	DNA recombination	Paulsen
	18	DNA repair	Paulsen
10	19	Mobile DNA elements	Paulsen
	20	Mobile DNA elements	Paulsen
11	21	Genome Sequencing	Paulsen

	22	**Genomes, Pan-Genomes and Metagenomics**	Paulsen
12	23	**Bioinformatics and Genome Annotation**	Paulsen
	24	**Functional Genomics and Systems Biology**	Paulsen
13	25	**Synthetic Biology**	Paulsen
	26	**Revision**	Paulsen

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). 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.

Changes since First Published

Date	Description
04/02/2020	Only one amendment - changed the form to say that this unit is co-badged with BMOL 6432. Therefore it now says BMOL 3402/6432.