



COURSE OUTLINE

FACULTY OF SCIENCE

SCHOOL OF BIOTECHNOLOGY AND
BIOMOLECULAR SCIENCES

BABS3121

Molecular Biology of Nucleic Acids

Term 1, 2021

1. Course Information

NB: some of this information is available on the [UNSW handbook](#)¹.

Year of Delivery	2021			
Course Code	BABS3121			
Course Name	Molecular Biology of Nucleic Acids			
Academic Unit	School of Biotechnology and Biomolecular Sciences			
Level of Course	3 rd year undergraduate			
Units of Credit	6			
Term(s) Offered	T1			
Assumed Knowledge, Prerequisites or Co-requisites	Prerequisites: BIOC2201, BIOC2101 or BABS2204 or BABS2264 or BABS2202 or MICR2011			
Hours per Week	7			
Number of Weeks	10 weeks			
Commencement Date	Monday 17 th February 2021 (Week 1)			
Summary of Course Structure (for details, see 'Course Schedule and Structure')				
Component	Hours/week	Time	Day	Location
Lectures (Weeks 1-10)	3			
Lecture 1		3 – 4 pm	Monday	Online
Lecture 2		9-10 am	Tuesday	Online
Lecture 3		2-3pm	Wednesday	Online
Laboratory (Weeks 2-9)	4			
Laboratory – Option 1		9 am – 1 pm	Thursday	D26 Teaching Lab 10 or online
Laboratory – Option 2		2 – 6 pm	Thursday	D26 Teaching Lab 10 or online
Special details	Any students with special requirements resulting from a disability should consult the course convener by Week 2 of Term 1 so that the appropriate resources can be provided.			

¹ <https://www.handbook.unsw.edu.au/undergraduate/courses/2021/BABS3121/>

2. Course Details

Course Description²	<p>The syllabus comprises a detailed analysis of gene structure and function which includes: structure and properties of polynucleotides such as DNA and RNA; structure of chromatin; mechanisms and regulation of gene replication, transcription and translation, DNA replication and repair; recombinant DNA technology; nucleic acid sequencing, recombinant DNA technology, application of genomics and proteomics, RNA-seq analyses. Practical work provides extensive experience with contemporary molecular techniques as well as basic bioinformatics skills; literature surveys and web-based research are also used to enhance the theoretical and practical aspects of the syllabus.</p>
Course Aims³	<p>The overall aim of the course is to provide a solid foundation in molecular techniques as well as an introduction to informatics-based methods from which students can pursue future work in industry or academia (including Honours projects). This course complements and supports other BABS courses. Weekly practical sessions provide exposure to procedures used in the routine manipulation and analysis of DNA and associated products (including RNA and proteins).</p> <p>Aims:</p> <ul style="list-style-type: none"> • Create an environment for student engagement and motivation • Student application of their learning to real-life problems • Provide a solid foundation for further nucleic acid work • Promote UNSW graduate attributes including teamwork
Student Learning Outcomes (CLO)⁴	<p>At the successful completion of this course you (the student) should be able to:</p> <ol style="list-style-type: none"> 1. Perform experimental analysis of gene expression at the mRNA and protein level. This includes planning of laboratory work, recording observations and data, analysis and interpretation of results and the proper and safe use of laboratory equipment. 2. Carry out basic bioinformatic analyses of transcriptomic data. 3. Apply theory and practical methods to the understanding of molecular biology and regulation of expression of genes as well as designing approaches for analysis of gene expression 4. Critically evaluate scientific literature relevant to molecular biology 5. Identify the features of quality writing and apply to their own scientific report and essay style writing, and scientific presentations.

² <http://timetable.unsw.edu.au/2021/BABS3121.html>

³ <https://student.unsw.edu.au/course-outlines>

⁴ <https://teaching.unsw.edu.au/learning-outcomes>

Relationship between Course and Program Learning Outcomes and Assessments

For Program Learning Outcomes (PLO), please refer to:

<https://www.handbook.unsw.edu.au/undergraduate/programs/2019/3970>

Course Learning Outcome (CLO)	LO Statement	Program Learning Outcomes (PLO)	Related Tasks & Assessment
1	Perform experimental analysis of gene expression at the mRNA and protein level	1. Ethical, social and professional understanding 2. Teamwork, collaborative and management skills. 5. Research, enquiry and analytical thinking abilities	Assessment 2: Laboratory work
2	Apply theory and practical methods to the understanding of molecular biology and regulation of expression of genes as well as designing approaches for analysis of gene expression	2. Teamwork, collaborative and management skills 5. Research, enquiry and analytical thinking abilities 6. Capability and motivation for intellectual development	Assessment 1: Mid-term Assessment 2: Laboratory work Assessment 3: Final Exam
3	Critically evaluate scientific literature relevant to molecular biology	3. Information literacy including the ability to make appropriate and effective use of information 6. Capability and motivation for intellectual development	Assessment 3: Final Exam
4	Identify the features of quality writing and apply to their own scientific report and essay style writing	4. Effective and appropriate communication in both professional and social context 6. Capability and motivation for intellectual development	Assessment 1: Mid-term Assessment 2: Laboratory work Assessment 3: Final Exam

3. Staff

See below for course contact details for course convenors and lecturers.

Position	Name	Email	Consultation times & locations	Contact Details
Course Convenor	A/Prof Irina Voineagu	i.voineagu@unsw.edu.au	By appointment	E26 Room 3107 9385 0114
Lecturers	Prof. Merlin Crossley Dr Michael Janitz A/Prof. Louise Lutze-Mann Dr Richard Edwards Prof. John Mattick Prof. Marcel Dinger	m.crossley@unsw.edu.au m.janitz@unsw.edu.au l.lutze-mann@unsw.edu.au richard.edwards@unsw.edu.au j.mattick@unsw.edu.au m.dinger@unsw.edu.au	By appointment	
Technical Staff & Demonstrators	Lana Ly Manan Shah Henry Bell Emily Vohralik Annalise Psaila Ryan Separovich Ashton Curry-Hyde Gee Chong Ling		During laboratory sessions	

4. Strategies and Approaches to Learning

Learning and Teaching Activities	<p>Throughout the course, students are encouraged to develop problem-solving skills and to critically evaluate concepts, ideas and research results by participating in all face-to-face activities such as lectures and practical classes. Also, online learning materials will be made available to further assist students' learning.</p> <p>Lectures serve to emphasize certain principles covered in the text, provide an overview and connect the individual components of the course. They may also cover current ideas and research. The lectures provide a guide to the material need to cover for the course. Most lectures will closely follow the textbook or there will be resource material identified. However, students are encouraged to extend their knowledge by reading from a variety of sources. Lecture notes and recordings are also available online.</p> <p>Laboratory based experimentation is an essential part of modern science. The practicals in this course are designed for students to learn and enhance their lab techniques and are designed to complement the lecture series.</p>
---	---

5. Course Schedule and Structure

Relationship to Other Courses within the Program	<p>This course syllabus builds on students' prior knowledge and skills gained in coursework offered by the School of BABS, in particular 'Principles of Molecular Biology (Advanced) (BIOC2201).</p> <p>The course is also highly recommended for students wishing to pursue an Honours project within the School of BABS in genetics, molecular and cell biology and microbiology.</p>
---	---

Course Timetable

Week (Start)	Mon 3-4 pm, Tue 9-10am, Wed 2-3pm. Lecturers: IV -Irina Voineagu; MJ – Michael Janitz; LLM – Louise Lutze-Mann; MC – Merlin Crossley; RE – Richard Edwards; JM – John Mattick; MD – Marcel Dinger.	Practical Thu Lab 10 Group1: 9am Group 2: 2pm	Quizzes
1 (15/2)	15/2 3-4 pm: Course Introduction (IV) 16/2 9-10am: Transcription/Control of Gene Expression 1 (MC) 17/2 2-3pm: Transcription/Control of Gene Expression 2 (MC)	GFP Exp 1 – Online (self-paced)	Quiz on GFP Exp1 released on Thu 9am
2 (22/2)	22/2 3-4 pm: Basic Techniques 1 (MJ) 23/2 9-10am: Basic Techniques 2 (MJ) 24/2 2-3pm: Basic Techniques 3 (MJ)	GFP Exp 2 Group1: Henry, Annalise, Lana Group2: Nicole, Ashton, Ryan	Quiz on GFP Exp1 due on Thu 9am
3 (1/3)	1/3 3-4 pm: Transcription/Control of Gene Expression 3 (MC) 2/3 9-10am: Transcription/Control of Gene Expression 4 (MC) 3/3 2-3pm: Transcriptome 1 (RE)	GFP Exp 3 Group1: Henry, Annalise, Lana Group2: Nicole, Ashton, Ryan	Quiz on GFP Exp2,3 released on Thu 9am
4 (8/3)	8/3 3-4 pm: Transcriptome 2 (RE) 9/3 9-10am: Transcriptome 3 (RE) 10/3 2-3pm: Transcriptome 4 (RE)	CRISPR Group1: Henry, Annalise, Lana Group2: Nicole, Ashton, Ryan	Quiz on GFP Exp2,3 due on Thu 9am
5 (15/3)	15/3 3-4 pm: Non-coding RNAs (JM) 16/3 9-10am: Viral Vectors/Critiquing Research Articles/Good writing 1 (LLM) 17/3 2-3pm: Viral Vectors/Critiquing Research Articles/Good writing 2 (LLM)	RNA-seq 1 – Online Irina, Nicole, Ashton	Quiz on RNA-seq1 released Thu 9am
6 (22/3)			
7 (29/3)	29/3 3-4 pm: MID-TERM EXAM 30/3 9-10am: Epigenetic regulation 1 (IV) 31/3 2-3pm: Epigenetic regulation 2 (IV)	RNA-seq 2 Group1: Ashton, Irina Group2: Nicole, Irina	Quiz on RNA-seq1 due Thu 9am
8 (5/4)	5/4 3-4 pm: Mon NO LECTURE (Easter Monday public holiday) 6/4 9-10am: RNA splicing and translation (IV) 7/4 2-3pm: DNA replication and repair 1 (IV)	RNA-seq 3, Presentation workshop Group1: Ashton, Irina Group2: Nicole, Irina	
9 (12/4)	12/4 3-4 pm: DNA replication and repair 2 (IV) 13/4 9-10am: Genomic instability (IV) 14/4 2-3pm: Clinical Genomics 1 (MD)	Minisymposium	All presentation slides are due on Thursday week9, 9am
10 (19/4)	19/4 3-4 pm: Clinical Genomics 2 (MD) 20/4 9-10am: Career Conversations (Panel) 21/4 2-3pm: NO LECTURE	Minisymposium	

Red: assessment tasks; Blue: online practicals; Green: face-to-face practicals

6. Assessment Tasks

Assessment Task		Format & Submission Methods	%	Due date
BABS Health & Safety Quiz <u>COMPULSORY</u> : Assess knowledge of safe working practices and procedures in BABS teaching laboratories		Online formats accessed via Moodle. Students only need to complete this quiz once for all BABS courses. Must be completed with 100% correct answers BEFORE your week 2 laboratory class.	-	Week 2 practical
Assessment 1: Mid-term exam (1h)		1 hour written exam administered online, covering lectures from weeks 1-5.	30	March 29 3-4 pm.
Assessment 2: Practical work	Quizzes based on laboratory work	Multiple-choice quizzes, 10 questions each, administered online, available for one week before due date.	18	Week 2, week 4 and week 6 practicals, 9am.
	RNA-seq analysis presentation	Individual 10-min powerpoint presentations based on literature search and RNA-seq data analysis	18	Week 9 practical, 9am.
	Laboratory notebook	Online laboratory notebook	4	Week 10 practical, 9am
Assessment 3: Final Written Exam (1h)		1 hour written exam administered online, covering lectures from weeks 7-10.	30	Exam period (TBA)
TOTAL			100	

Bonus points: Students are encouraged to submit an MCQ question for each lecture, within one week from the lecture date. Each question submitted on lecture material is worth 0.2 bonus points. Submitting a question for all 22 lectures (excluding lecture 1) is worth 5 bonus points.

7. Additional Resources and Support

Textbooks	<p>Alberts <i>et al.</i>, <i>Molecular Biology of the Cell</i>, 6th ed. (Garland, 2014) – Molecular Cell focus</p> <p style="text-align: center;">OR</p> <p>Watson <i>et al.</i>, <i>Molecular Biology of the Gene</i>, 7th ed. (Benjamin Cummings, 2013) – Molecular genetics focus</p>
Course Manual	A soft copy will be posted on Moodle and OneNote.
Viral Vectors in Gene Therapy Readings	<p>Overview: Emerging Platform Bioprocesses for Viral Vectors and Gene Therapies (http://www.bioprocessintl.com/2016/emerging-platform-bioprocesses-for-viral-vectors-and-gene-therapies/)</p> <p>Gene therapies development: slow progress and promising prospect (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5328344/)</p>
Viral Vector Gene Therapy Case Studies	<ol style="list-style-type: none"> 1. Degenerative eye disease (choroideremia) gene therapy <ul style="list-style-type: none"> • See report in New Scientist (http://www.newscientist.com/article/dn24879-gene-therapy-restores-sight-in-people-with-eye-disease.html#.UzpP1v6KC70) • Original Lancet journal article available on Moodle 2. Monkey colour vision (dichromatic → trichromatic, male polymorphism) <ul style="list-style-type: none"> • See report in Nature News (http://www.nature.com/news/2009/090916/full/news.2009.921.html) • Original Nature Article (<i>Katherine Mancuso, et al. Nature, Vol. 461, No. 7261, September 16, 2009.</i>) available on Moodle
Resources	<p>The Learning Centre - http://www.lc.unsw.edu.au</p> <p>Essay and Assignment Writing - https://student.unsw.edu.au/essay-and-assignment-writing</p> <p>Exam Preparation Tips - https://student.unsw.edu.au/exam-preparation</p>

8. Required Equipment, Training and Enabling Skills

Equipment Required	Personal protection equipment (PPE) such as safety glasses and a lab coat will be required for all practical work.
Enabling Skills, Training Required to Complete this Course	It is expected that all students will have had basic Health & Safety training and completed a safety quiz on Moodle prior to the Week 2 practical.

9. Administration Matters

Expectations of Students	<p>Students are expected to attend all lectures and practical classes. Attendance records will be kept in practical classes. Attendance at less than 80% of classes may result in the grade of UF. Students are expected to maintain an accurate record of their laboratory work in a Laboratory Notebook. This is generally in an electronic or online form like OneNote. Laboratory demonstrators will check and provide feedback on the students records in the Laboratory Notebook.</p> <p>Students are expected to consult the course Moodle site on at least a weekly basis.</p> <p>Protocols governing email, social networks and discussion forums.</p> <p>Social networks (i.e. Facebook, Twitter etc) will not be used to share class materials and a way to contact academics including demonstrators/tutors involved in this course. If students have course-related questions, they are encouraged to use discussion forums on the course's Moodle website. These are monitored regularly. If more help is needed, students may send enquiries or requests for appointments from their UNSW email. When sending an email to the course coordinator, a student must state their name, student number and the course in which they are enrolled.</p>
Assignment Submissions	<p>If assessment tasks are not completed, then they will receive a mark of zero.</p> <p>In the case that they are submitted late, without acceptable special consideration application, then they will be accepted but penalised up to 10% per day they are late. If medical grounds preclude submission of a report by the due date, contact should be made with the course authority as soon as possible.</p> <p>Electronic submissions will be through TurnItIn. In the case of electronic submission, no paper versions will need to be submitted.</p>
Occupational Health and Safety⁵	<p>Biochemical laboratories contain apparatus and chemicals that are potentially dangers when misused or handled carelessly. Consequently, safe experimental procedures and responsible conduct in the laboratory are essential at all times. The regulations governing conduct in the laboratory have been set down by the NSW Occupational Health & Safety (Hazardous Substances) Regulation 1996, NSW Draft OHS Regulation 2000, and the NSW Workcover Publications and Worksafe National Codes of Practice and Guidance Notes. These policies apply to all university staff and students.</p> <p>Students are responsible for:</p> <ul style="list-style-type: none"> • Complying with the requirements for this policy, legislation and Australian Standards • Following directions given to them by the person supervising their work • Co-operating in the performance of risk assessments • Participating in induction and training programs <p style="text-align: center;">ALL ACCIDENTS WITH CHEMICAL OR INJURIES MUST BE REPORTED IMMEDIATELY TO YOUR DEMONSTRATOR OR TO A MEMBER OF THE PREPARATION/TECHNICAL STAFF.</p>
Assessment Procedures UNSW Assessment Policy⁶	<p>Please refer to the specific assessment outline in section 6.</p>
Equity and Diversity	<p>Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course Convenor prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equity and Diversity Unit (9385 4734 or http://www.studentequity.unsw.edu.au/)</p> <p>Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.</p>

Administrative and Support Matters	School Contact	Faculty Contact	Academic Disability	Bioscience Student Office
Student Complaint Procedure⁷	Dr Anne Galea <i>Acting Director of Teaching</i> a.galea@unsw.edu.au Tel: +61 2 9385 8156	Dr Gavin Edwards <i>Associate Dean (Academic Programs)</i> g.edwards@unsw.edu.au Tel: +61 2 9385 4652	Dr Megan Lenardon <i>Science Academic Disability Adviser and School "At risk student" Support</i> m.lenardon@unsw.edu.au Tel: +61 2 9385 1780	Ms Julna Zhao <i>Student Advisor (BABS)</i> unsw.to/webforms Tel: +61 (2) 9385 8047
Additional Support for Students	<ul style="list-style-type: none"> • The Current Students Gateway: https://student.unsw.edu.au/ • Academic Skills and Support: https://student.unsw.edu.au/academic-skills • Student Wellbeing, Health and Safety: https://student.unsw.edu.au/wellbeing • Disability Support Services: https://student.unsw.edu.au/disability-services • UNSW IT Service Centre: https://www.myit.unsw.edu.au/ 			

⁵ <https://safety.unsw.edu.au/staff-student-resources/students>

⁶ <https://www.gs.unsw.edu.au/policy/assessmentpolicy.html>

⁷ <https://student.unsw.edu.au/complaint>

10. UNSW Academic Integrity, Referencing and Plagiarism

What is plagiarism?

Plagiarism is the presentation of the thoughts or work of another as one's own.

*Examples include:

- direct duplication of the thoughts or work of another, including by copying material, ideas or concepts from a book, article, report or other written document (whether published or unpublished), composition, artwork, design, drawing, circuitry, computer program or software, web site, Internet, other electronic resource, or another person's assignment without appropriate acknowledgement;
- paraphrasing another person's work with very minor changes keeping the meaning, form and/or progression of ideas of the original;
- piecing together sections of the work of others into a new whole;
- presenting an assessment item as independent work when it has been produced in whole or part in collusion with other people, for example, another student or a tutor; and
- claiming credit for a proportion a work contributed to a group assessment item that is greater than that actually contributed.†

For the purposes of this policy, submitting an assessment item that has already been submitted for academic credit elsewhere may be considered plagiarism.

Knowingly permitting your work to be copied by another student may also be considered to be plagiarism.

Note that an assessment item produced in oral, not written, form, or involving live presentation, may similarly contain plagiarised material.

The inclusion of the thoughts or work of another with attribution appropriate to the academic discipline does *not* amount to plagiarism.

The Learning Centre website is main repository for resources for staff and students on plagiarism and academic honesty. These resources can be located via: <https://student.unsw.edu.au/plagiarism>

The Learning Centre also provides substantial educational written materials, workshops, and tutorials to aid students, for example, in:

- correct referencing practices;
- paraphrasing, summarising, essay writing, and time management;
- appropriate use of, and attribution for, a range of materials including text, images, formulae and concepts.

Individual assistance is available on request from The Learning Centre.

Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting, and the proper referencing of sources in preparing all assessment items.

* Based on that proposed to the University of Newcastle by the St James Ethics Centre. Used with kind permission from the University of Newcastle

† Adapted with kind permission from the University of Melbourne

11. Special Consideration and Supplementary Exams

Students who believe that their performance, either during the session or in the end of term exams, may have been affected by illness or other circumstances may apply for special consideration. Applications can be made for compulsory class absences such as (laboratories and tutorials), in-session assessments tasks, and final examinations.

You must submit the application prior to the start of the relevant exam, or before a piece of assessment is due, except where illness or misadventure prevent you from doing so. If you become unwell on the day of the exam or fall sick during an exam, you must provide evidence dated within 24 hours of the exam, with your application. You must obtain and attach Third Party documentation before submitting the application. Failure to do so may result in the application being rejected.

UNSW has a fit to sit/submit rule which means that if you sit an exam or submit a piece of assessment, you are declaring yourself fit to do so.

You must obtain and attach Third Party documentation before submitting the application. Failure to do so may result in the application being rejected.

Further information on special consideration can be found at <https://student.unsw.edu.au/specialconsideration>.

⁸ International Center for Academic Integrity, 'The Fundamental Values of Academic Integrity', T. Fishman (ed), Clemson University, 2013.

11.1 How to Apply for Special Consideration

The application must be made through Online Services in [myUNSW](#) (My Student Profile tab > My Student Services > Online Services > Special Consideration).

Students will be contacted via *their official university email* as to the outcome of their application. It is the responsibility of all students to regularly consult their official student email accounts and myUNSW in order to ascertain whether or not they have been granted further assessment.

11.2 Supplementary Examinations

Supplementary examinations may be given to those students who were absent from mid-term or final exams due to illness or misadventure. Only students who submit a compliant Special Consideration application (as per the above instructions) may be eligible for a supplementary examination. Students will be notified via the online special consideration system and their official UNSW email account as to the outcome of their application. Supplementary **mid-term examinations** will be managed internally by your course convenor and held during term. Supplementary **final examinations** will be managed externally by UNSW Exams Branch and held during the official BABS Supplementary Final Examination period.

The BABS Supplementary Final Exam period for Term 1, 2021 is:

TBA

It is the responsibility of all students to regularly consult their official student email accounts and myUNSW in order to ascertain whether or not they have been granted further assessment. Supplementary Final Exams will be offered during this period ONLY. Failure to sit for the appropriate exam that you have been offered may result in an overall failure for the course. Further assessment will NOT be offered on any alternative dates.

See here for more details on special consideration (<https://student.unsw.edu.au/special-consideration>).