



# Course Outline

BIOC3111

Molecular Biology of Proteins

School of Biotechnology and  
Biomolecular Science

Faculty of Science

Term 2, 2019

## 1. Staff

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Position	Name	Email	Consultation times and locations	Contact Details
Course Convenor	Prof. Marc Wilkins	m.wilkins@unsw.edu.au	By Appointment Room 2112, E26	9385-3633 BABS, UNSW
Lecturer	Dr Till Boeking	till.boeking@unsw.edu.au	By Appointment	SOMS, UNSW
	Prof. Paul Curmi	p.curmi@unsw.edu.au	By Appointment	Physics, UNSW
	Dr. Anthony Duff	adu@ansto.gov.au	N/A	ANSTO
	Dr. Bruno Gaeta	bgaeta@unsw.edu.au	By Appointment	CSE, UNSW
	Dr. Gene Hart-Smith	g.hart-smith@unsw.edu.au	By Appointment	BABS, UNSW
	Dr. Fatemeh Vafaei	f.vafaei@unsw.edu.au	By Appointment	BABS, UNSW
Practical Technician	Dr. Owen Sprod			BABS, UNSW
Demonstrators	Dr. Owen Sprod Ms. Daniela Lee-Smith Mr. Ryan Separovich			BABS, UNSW

## 2. Course information

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Units of credit: 6

Pre-requisite(s): BIOC2101 or LIFE2101, BIOC2201

Teaching times and locations, see:

<http://timetable.unsw.edu.au/2019/BIOC3111.html>

## 2.1 Course summary

BIOC3111 is all about proteins. It builds on the concepts of protein structure and function introduced in the two pre-requisite courses, BIOC2101 and BIOC2201. It is a course that most students really enjoy, and which students rate very highly in UNSW surveys (MyExperience). BIOC3111 serves as an introduction to modern protein science. The lecture series covers fundamental aspects of protein structure and function, with an emphasis on the tools and processes. It has a further emphasis on proteomics, which is the large-scale study of proteins inside the cell.

The course is a core third year component in biochemistry majors and an elective in other related discipline areas such as biotechnology, bioinformatics and molecular biology. The teaching in Molecular Biology of Proteins gives valuable experience in the enquiry process underlying scientific research and discovery. In particular, the practical course is an extended 8-week project that encourages student involvement in experimental design and gives extensive hands-on experience. The course also gives focused training in scientific writing and detailed feedback on lab reports.

## 2.2 Course aims

The course aims to provide a solid foundation from which students can pursue advanced work with proteins, in industry or academia (including Honours or PhD projects that involve protein characterisation). Weekly practical sessions provide exposure to procedures used in the purification and analysis of proteins, with particular attention to the planning and execution of experimental protocols. Students will gain experience in protein analysis by mass spectrometry.

Aims:

- Provide a solid foundation for further work on proteins
- Create an environment for student engagement and motivation
- Application of learning to real-life experimental research
- Promote UNSW graduate attributes including team work in labs

## 2.3 Course learning outcomes (CLO)

On successful completion of this course, you should have the following learning outcomes:

### Knowledge

- Explain the main research areas of modern protein science and their relevance to biology
- Explain the fundamental concepts of modern techniques in protein analysis

### Skills

- Practice laboratory techniques in protein purification and analysis
- Communicate experimental results in the form of written scientific reports

### Application of Knowledge and Skills

- Identify and critically evaluate relevant scientific literature
- Design scientific experiments with appropriate controls, creatively solve problems by troubleshooting, interpret experimental data

## 2.4 Relationship between course and program learning outcomes and assessments

Course Learning Outcome (CLO)	LO Statement	Program Learning Outcome number 1 to 6 (see definitions below)	Related Tasks & Assessment
CLO 1	Explain the main research areas of modern protein science and their relevance to biology	6	Lecture program, Mid-semester test, final exam
CLO 2	Explain the fundamental concepts of modern techniques in protein analysis	6	Lecture program, Mid-semester test, final exam
CLO 3	Practice laboratory techniques in protein purification and analysis	1, 2, 4	Practicals, lab reports 1 and 2
CLO 4	Communicate experimental results in the form of written scientific reports	4	Practicals, lab reports 1 and 2
CLO 5	Identify and critically evaluate relevant scientific literature	3, 6	Practicals, lab reports 1 and 2
CLO 6	Design scientific experiments with appropriate controls, creatively solve problems by troubleshooting, interpret experimental data	1, 5, 6	Practicals, lab reports 1 and 2

### Bachelor of Science Program Learning Outcomes

1. Ethical, social and professional understanding including the ability to critically reflect upon broad ethical principles and codes of conduct in order to behave consistently with a personal respect and commitment to ethical practice and social responsibility, multicultural, cultural and personal diversity.
2. Teamwork, collaborative and management skills including the ability to recognise opportunities and contribute positively to collaborative scientific research, and to demonstrate a capacity for self management, teamwork, leadership and decision making based on open-mindedness, objectivity and reasoned analysis in order to achieve common goals and further the learning of themselves and others.
3. Information literacy including the ability to make appropriate and effective use of information and information technology relevant to their discipline.
4. Effective and appropriate communication in both professional (intra and inter disciplinary) and social (local and international) contexts.
5. Research, enquiry and analytical thinking abilities including the ability to construct new concepts or create new understanding through the process of enquiry, critical analysis, problem solving and research.

6. Capability and motivation for intellectual development; including capacity for creativity, critical evaluation, entrepreneurship and demonstrating a commitment to their own learning, motivated by curiosity and an appreciation of the value of learning.

Note that the program learning outcomes for the Bachelor of Science are also given in full at this link: <https://www.handbook.unsw.edu.au/undergraduate/programs/2019/3970> under “Learning Outcomes”.

## **3. Strategies and approaches to learning**

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### **3.1 Learning and teaching activities**

Lectures in the course are used to cover fundamental concepts of relevance to modern protein science. Lectures are also a good way for students can interact with lecturers, to question and explore points of interest or to clarify certain materials. Lecture material is closely integrated with the laboratories of the course, providing useful background for the approaches used and the experiments to be done. The lectures do not follow any particular text book, however lecturers may provide additional reading for their parts of the course. Lecture notes and recordings will be available online.

Quizzes are being developed to reinforce materials covered in the lectures. These will be available on-line, in a variety of different formats. Students will be encouraged to do these during periods of waiting in the practical classes.

Laboratories in the course are used to give students extensive hands-on experience in protein chemistry and protein science. A single project is done throughout the course, and students are encouraged to work in a relatively independent way. The laboratory reports provide an opportunity for students to write results in the format of a compact scientific publication. This develops literature research and scientific writing skills. A writing workshop is given before the first report is due.

### **3.2 Expectations of students**

Students are expected to attend all practical classes. Attendance records will be kept in practical classes, attendance at less than 80% of classes may result in the grade of UF. You must let the course co-ordinator know in advance if you are going to miss a practical class.

Students are expected to keep a paper-based lab book for the course. This lab book is to be a ‘working’ lab book, complete with notes, scribbles, calculations, along with relevant results. Its purpose is to record what you’ve done, allow you to go back and check things and to help you trouble shoot if required. It is to be checked each week by a demonstrator and will be checked at the end of the course for completeness, as part of your assessment. There is no expectation that the lab book be pristine (in terms of presentation, handwriting, figures and so on), as it is a working document. But it should record what you’ve done and what you’ve found in a comprehensive way.

The course’s Moodle site will be used for lecture notes, some readings, prac notes, prac results, and for announcements. The course can also be used for discussion forums, if the class decides that would be useful. Social media will not be used to formally share class materials by the course co-ordinator or lecturers. Emails can be sent to the course co-ordinator or lecturers. When doing so, please include “BIOC3111 question” in the subject of the email to make it easy for receivers to spot the email.

## 4. Course schedule and structure

This course consists of 26 hours of lectures and 33 hours of practicals. You are expected to take an additional 40 hours of non-class contact hours to complete assessments, readings and exam preparation.

<b>Week date</b>	<b>Lecture 1 Monday 12 – 1 pm Business E12-115</b>	<b>Lecture 2 Tuesday 11 – 12 pm AGSM G27-G04</b>	<b>Lecture 3 Friday 9 - 10 am Business E12-115</b>	<b>Practical Monday 2 - 6 pm Lab 11. E26-1101.</b>
<b>Week 1 3<sup>rd</sup> June</b>	Course introduction and OHS (MW)	Sequences and protein evolution I (MW)	Sequences and protein evolution II (MW)	Introduction and protein assays
<b>Week 2 10<sup>th</sup> June</b>	(public holiday – no lecture)	Post translational modifications I (MW)	Post translational modifications II (MW)	(public holiday - no lab)
<b>Week 3 17<sup>th</sup> June</b>	Protein bioinformatics I (BG)	Protein bioinformatics II (BG)	Protein engineering I (TB)	Protein purification I
<b>Week 4 24<sup>th</sup> June</b>	Protein engineering II (TB)	Mass spectrometry I (GHS)	Mass spectrometry II (GHS)	Protein purification II <b>Early bird quiz</b>
<b>Week 5 1<sup>st</sup> July</b>	Proteomics I (MW)	Proteomics II (MW)	Complementary methods in structural biology I (AD)	Protein purification III
<b>Week 6 8<sup>th</sup> July</b>	Workshop on report writing	Complementary methods in structural biology II (AD)	Biophysical analysis I (PC)	Enzyme Assays
<b>Week 7 15<sup>th</sup> July</b>	Biophysical analysis II (PC)	Protein folding and binding I (PC)	Protein folding and binding II (PC)	Mass spectrometry <b>Report 1 due</b>
<b>Week 8 22<sup>nd</sup> July</b>	The human proteome project (MW)	Clinical proteomics (MW)	Protein-protein interactions I (MW)	Protein crosslinking
<b>Week 9 29<sup>th</sup> July</b>	Protein-protein interactions II (MW)	Protein-protein interactions and crosslinking III (MW)	Systems Biology of Networks (FV)	Mass spectrometry data analysis
<b>Week 10 5<sup>th</sup> August</b>	(no lectures)	(no lectures)	(no lectures)	Revision and study guide for exam <b>Report 2 due, Lab book due</b>

Lecturers. MW – Marc Wilkins. BG – Bruno Gaeta. TB – Till Boeking. PC – Paul Curmi. AD – Anthony Duff. GHS – Gene Hart-Smith. FV – Fatemeh Vafaei.

## 5. Assessment

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### 5.1 Assessment tasks

Assessment task and methods		Weighting (%)	Submission method	Mark and feedback methods	Due date
<b>Assessment 1:</b> Early Bird Quiz		12.5	At the start of laboratory session	Feedback to group on areas of weakness in quiz.  Marks within 1 week after quiz.	Week 4, in prac
<b>Assessment 2:</b> Individual Short Report 1		20	In laboratory session and online via Moodle	Individual, written feedback on report from course co-ordinator.  Feedback 2 weeks after submission.	Week 7, in prac
<b>Assessment 3:</b> Laboratory Reports	Lab book	5	Checked at start of each prac class	Lab notebook will be stamped and signed off by a demonstrator.  Mark awarded after prac.	Final check in Week 10 prac class
	Individual Short Report 2	25	In laboratory session and online via Moodle	Individual, written feedback on report from course co-ordinator.  Feedback 2 weeks after submission.	Week 10, in prac
<b>Assessment 4:</b> Final Examination		37.5		Questions marked by each relevant lecturer	As timetabled

#### Further information

UNSW grading system: <https://student.unsw.edu.au/grades>

UNSW assessment policy: <https://student.unsw.edu.au/assessment>

## 5.2 Assessment criteria and standards

The lecture component of the course is assessed through the early bird quiz and then the final exam. Lecture material is only assessed once, in that material assessed in the quiz is not re-assessed during the final exam.

The laboratory component of the course is assessed through written reports. It is important to note that the reports are not assessed on how well or how 'perfectly' the experiments have worked. Research experiments sometimes don't go as planned and can take many times to get just right (which is not always possible in an undergraduate lab)! So, the reports focus instead on how well the obtained results can be explained and interpreted in a scientifically robust way.

More details on the content of lab reports and how they will be graded will be provided during the course, in the pracs and will be online via Moodle.

## 5.3 Submission of assessment tasks

Individual reports will be submitted at the start of the prac, on the week they are due. These are to be submitted as paper copies and potentially also as electronic submissions via Moodle. Instructions will be given on this during the pracs.

If assessment tasks are not completed, the student will receive a mark of zero for that task. In the case that tasks are submitted late, without appropriate special consideration, they will be accepted but penalised at up to 10% per day that they are late (that is, 10% of the mark awarded will be deducted each day).

## 5.4. Feedback on assessment

Assessment 1: early bird quiz

Feedback to group on areas of weakness in quiz, including specific questions. Marks within 1 week after quiz.

Assessment 2: individual short report 1

Individual, detailed written feedback on report from course co-ordinator. Feedback 2 weeks after submission.

Assessment 3: lab report

Lab book - lab notebook will be stamped and signed off by a demonstrator. Marks within 1 week of the final prac.

Individual short report 2 - Individual, written feedback on report from course co-ordinator. Feedback 2 weeks after submission.

Assessment 4: Final exam

The course marks will be reported back to students by The University; this will take into account the mark from the final exam.

## 6. Academic integrity, referencing and plagiarism

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*Indicate the preferred referencing style with links to resources on how to use it.*

**Referencing** is a way of acknowledging the sources of information that you use to research your assignments. You need to provide a reference whenever you draw on someone else's words, ideas or research. Not referencing other people's work can constitute plagiarism.

Further information about referencing styles can be located at <https://student.unsw.edu.au/referencing>

**Academic integrity** is fundamental to success at university. Academic integrity can be defined as a commitment to six fundamental values in academic pursuits: honesty, trust, fairness, respect, responsibility and courage.<sup>1</sup> At UNSW, this means that your work must be your own, and others' ideas should be appropriately acknowledged. If you don't follow these rules, plagiarism may be detected in your work.

Further information about academic integrity and **plagiarism** can be located at:

- The *Current Students* site <https://student.unsw.edu.au/plagiarism>, and
- The *ELISE* training site <http://subjectguides.library.unsw.edu.au/elise/presenting>

The *Conduct and Integrity Unit* provides further resources to assist you to understand your conduct obligations as a student: <https://student.unsw.edu.au/conduct>.

## 7. Readings and resources

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There is no set text book for this course. Lecturers will instead refer you largely to reviews of particular areas and also to some primary research papers. Most of these can be found on-line, however any that are hard to find will be put on the course web-site on Moodle.

All students enrolled in courses offered at BABS automatically have access to the course Moodle site <https://moodle.telt.unsw.edu.au>. This site will be used to distribute course notes and information and should be checked at regular intervals. This includes:

- Lecture handouts and recordings
- Practical notes and results generated from labs
- Assessments
  - detailed information on lab reports
  - revision quizzes
  - study guide information prior to tests and exams
- Information about examination arrangements
- Self-management resources

There are study areas where students can study or relax on the ground floor and first floor of the Biological Sciences Building, E26.

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<sup>1</sup> International Center for Academic Integrity, 'The Fundamental Values of Academic Integrity', T. Fishman (ed), Clemson University, 2013.

## 8. Special consideration and supplementary exams

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Students who believe that their performance, either during the session or in the end of session 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, 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.**

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. 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.

**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.

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

### 8.1 Supplementary exams

The University does not give deferred examinations. However, further assessment exams may be given to those students who were absent from the final exams through illness or misadventure. Special Consideration applications for final examinations and in-session tests will only be considered after the final examination period when lists of students sitting supplementary exams/tests for each course are determined at School Assessment Review Group Meetings. Students will be notified via the online special consideration system 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 they have been granted further assessment.

For Term 2 2019, Supplementary Exams will be scheduled between

9 Sep 2019 – 13 Sep 2019

Further assessment exams will be offered in this period ONLY and failure to sit for the appropriate exam may result in an overall failure for the course. Further assessment will NOT be offered on any alternative dates.

## 9. Administrative matters

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### **School Contact:**

Professor Marc Wilkins

School of Biotechnology and Biomolecular Sciences

Email: [m.wilkins@unsw.edu.au](mailto:m.wilkins@unsw.edu.au)

(for all emails, please put BIOC3111 in the subject line of the email)

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### **Faculty Contact:**

Associate Professor Dr Gavin Edwards

Associate Dean (Academic Programs)

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### **Biosciences Student Office:**

Julna Zhao

Student Advisor (BABS)

Room G06, Building D26

Tel: +61 (2) 9385 8915

For more detail see here: <https://www.babs.unsw.edu.au/contact/biosciences-student-office>

## 10. Additional support for students

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- 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.it.unsw.edu.au/students/index.html>