Course Outline

BABS3061

Medical Biotechnology

School of Biotechnology and Biomolecular Sciences

Term 3, 2020

Last Updated: 17.8.2020

1. Staff

Position	Name	Email	Locations	Consultation times
Course Convenor	Dr Megan Lenardon	m.lenardon@unsw.edu.au	Room 4103 BioSciences South (E26)	By appointment
Technical Officer/ Demonstrator	Dr Kate Roberts	k.roberts@unsw.edu.au		By appointment
Demonstrator	Mr Matthew Prokop	m.prokop@unsw.edu.au		By appointment
Demonstrator	Dr Marwan Majzoub	m.majzoub@unsw.edu.au		By appointment
Demonstrator	Ms Sally Crane	TBA		By appointment
Lecturer/ Demonstrator	Dr Mahdi Zeraati	m.zeraati@unsw.edu.au		By appointment
Lecturer	A/Prof. Megan Lord	m.lord@unsw.edu.au	Graduate School of Biomedical Engineering	By appointment
Lecturer	TBA			
Lecturer	TBA			

2. Course information

Units of credit: 6

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

Teaching times and locations: http://timetable.unsw.edu.au/2020/BABS3061.html

Lecture: Monday 13:00 - 14:00 Online

Lecture: Wednesday 15:00 – 17:00 Online

Practical: Friday 09:00 – 13:00 Biosciences South (E26) Teaching Lab 11 (K-E26-1101) OR online

Friday 09:00 – 13:00 Biosciences South (E26) Teaching Lab 12 (K-E26-1102) OR online

Friday 14:00 – 16:00 Biosciences South (E26) Teaching Lab 11 (K-E26-1101) OR online

2.1 Course summary

Biotechnology innovation is in a large part driven by the requirement for improvements in medical diagnosis and therapy for a range of diseases including autoimmune diseases, diseases of inflammation and cancer, and infectious diseases. Innovations in biomolecular therapies such as recombinant proteins, monoclonal antibodies, stem cells and novel bioinspired materials have and will continue to improve available medical treatments for many conditions. The course is designed to give students a detailed insight into the principles and techniques leading to these innovations. The practical work includes production of recombinant monoclonal antibody fragments, and pre-clinical assessment of their diagnostic and therapeutic potential.

2.2 Course aims

The lecture component of this course aims to present students with the background to medical problems and the technologies currently used to address them. The practical component will allow students to gain an insight into the scientific and pre-clinical development of novel monoclonal antibody-based therapeutics.

2.3 Course learning outcomes (CLO)

At the successful completion of this course you (the student) should be able to:

1. Demonstrate a coherent and advanced knowledge of monoclonal antibodies and how they are used to diagnose and/or treat human diseases.
2. Describe (and develop an appreciation and understanding of the complexities of) the process of the pre-clinical development of novel antibody-based therapeutics.
3. Develop capability in the generation, recording, analysis and reporting of data by conducting or observing lab-based experiments, keeping a laboratory notebook, analysing qualitative and quantitative data, and communicating the results in the form of an article suitable for publication in a scientific journal.
4. Demonstrate knowledge and understanding of current, non-antibody-based developments and applications in medical biotechnology, both in terms of the technology and the biology behind the technology.

2.4 Relationship between course and program learning outcomes and assessments

Course Learning Outcome (CLO)	LO Statement	Program Learning Outcome (PLO)*	Related Tasks & Assessment
CLO 1	Demonstrate a coherent and advanced knowledge of monoclonal antibodies and how they are used to diagnose and/or treat human diseases.	PLO 1, 2 and 5	Lectures LITERATURE REVIEW
CLO 2	Describe (and develop an appreciation and understanding of the complexities of) the process of the pre-clinical development of novel antibody-based therapeutics	PLO 1, 2, 3, 4 and 5	Practical JOURNAL ARTICLE
CLO 3	Develop capability in the generation, recording, analysis and reporting of data by conducting or observing lab-based experiments, keeping a laboratory notebook, analysing qualitative and quantitative data, and communicating the results in the form of an article suitable for publication in a scientific journal.	PLO 1, 2, 3, 4 and 5	Practical Lab book LAB TESTS JOURNAL ARTICLE
CLO 4	Demonstrate knowledge and understanding of current, non-antibody-based developments and applications in medical biotechnology, both in terms of the technology and the biology behind the technology.	PLO 1, 2 and 5	Lectures FINAL EXAM

*available at https://www.handbook.unsw.edu.au/undergraduate/programs/2020/3053

3. Strategies and approaches to learning

3.1 Learning and teaching activities

Lecture program

In 2020, all lectures will be online. Some of the lectures will be run asynchronously, i.e. they will be pre-recorded so that students can watch them online at any time. Other lectures will be run synchronously, i.e. students will need to be online while the material is delivered live. Details can be found in Section 4 of this document.

The lecture material will cover monoclonal antibodies and how they are used to diagnose and/or treat human diseases such as cancer and autoimmune diseases. Current, non-antibody-based developments and applications in medical biotechnology will also be covered, both in terms of the technology and the biology behind the technology. Specific topics include the development of diagnostics and vaccines for SARS- CoV-2, the virus that causes COVID-19, and tissue engineering and regenerative medicine.

The lecture material provided in the first few weeks will provide background to assist students in the completion of a literature review on monoclonal antibody approaches to cancer therapy. The remaining lecture material (not related to monoclonal antibodies) will be assessed in the final assessment.

Practical Program

In 2020, the practical component will run in dual mode. This means that students will have the option of doing the practical classes either face-to-face (F2F), or fully online (online-only).

For those students who can and want to come to campus and participate in F2F classes:

- There will be four F2F practical sessions which will be run in weeks 2, 3, 4 and 5.
- In the remaining weeks, the “practicals” will be run as online synchronous sessions.

For those students who cannot or do not want to come to campus (online-only):

- The practical sessions in weeks 2, 3, 4 and 5 will be run online concurrently with the F2F classes.
    - The practical sessions will be introduced to both the online-only and F2F students live at the start of each session.
    - While the F2F students are completing the experimental protocols in the teaching labs, the online-only students will watch recordings the experiments.
    - The **online-only students will be expected to be available at a specified time** during the practical slot where the results and data analysis will be discussed concurrently with the F2F students.
- In the remaining weeks, the “practicals will be online synchronous sessions.

Students must inform the course coordinator of any timetable clashes as soon as possible so that appropriate arrangements can be made.

The practical component of the course is designed to give students experience of the pre-clinical development of novel antibody-based therapeutics. This will involve the expression and purification of single chain antibody fragments, and the assessment of their diagnostic and therapeutic utility. Full details of the practical exercise will be provided during the course.

It is strongly advised that both the F2F and online-only students maintain a laboratory notebook to record their notes on the protocols, data and analysis for each practical session. At the end of the practical, the work will be written up in the format of a scientific journal article suitable for publication in the “*Journal of Fungi*”. The practical work will be assessed on the basis of the final written journal article, as well as four online lab tests which will be made available to the students via Moodle at the end of the practical sessions in weeks 2, 3, 4 and 5.

Workshops and Feedback sessions

Held within the lecture timeslots, workshops will be conducted to enhance the student's skills in scientific writing. Feedback sessions will be held in the lecture and practical timeslots to provide students with feedback on their assessment tasks.

Recording of online sessions

Synchronous online sessions in the course may be recorded for the purpose of supporting teaching activities and supporting equity and disability support services, similar to the normal Lecture Recordings+ which occur in UNSW lecture theatres. These recordings will only be used for these purposes. All participants will have access to the recording via Moodle and/or Teams.

By joining these online sessions, you are providing your consent to the recording of the session. To state your objection and deny consent, you must email the course coordinator stating that you do not consent to the recording.

3.2 Expectations of students

An integral part of this course in engagement in class activities. A pass in BABS3061 is conditional upon a satisfactory performance in all aspects of the course. A satisfactory performance means that you have:

- Attended 80% of the synchronous lectures (an attendance record will be kept)
- Attended 80% of the synchronous practical classes (an attendance record will be kept)
- Recorded all data and completed the calculations, questions and tests relating the practical classes.
- Satisfactorily submitted all assigned work.

If you miss a synchronous lecture or practical class due to illness or other circumstances, you must email the course coordinator within three days of the absence. Communications relating to the course should be from your official UNSW student email account.

Co-ordinator: Dr Megan Lenardon
Email: m.lenardon@unsw.edu.au

There is a formal procedure that must be followed relating to assessments. Further details on Special Consideration can be found in section 5.3 of the Course Outline (this document).

4. Course schedule and structure

This course consists of 7 hours of class contact hours per week. Additional non-class contact hours will be required to complete assessments.

Week	Lecture 1 (1 h) Monday 1-2 pm (online)	Lectures 2 and 3 (2 h) Wednesday 3-5 pm (online)	Practical (4 h) Fridays 9 am-1 pm (labs 11&12, or online) Friday 2-6 pm (lab 11 or online)
Week 1 14.9.20	Introduction to the course (MDL)	Monoclonal antibodies 1 & 2 (MDL) Live Q&A session (MDL)	Introduction to the practical and safety briefing (MDL) scAb production 1: expression and purification
Week 2 21.9.20	Monoclonal antibodies 3 (MDL) Live Q&A session (MDL)	Introduction to literature review (MDL) Workshop: Referencing (MDL)	scAb production 2: SDS-PAGE (MDL) **LAB TEST - online**
Week 3 28.9.20	Guest lecture: TBA (MZ)	Review of scAb production Introduction to scAb characterisation	scAb characterisation 1: Anti-mannan ELISA (MDL) **LAB TEST - online**
Week 4 5.10.20	Public holiday – no lecture	Workshop: Writing for Scientific Journals 1 - figures and figure legends (MDL)	scAb characterisation 2: Whole-bug ELISA (MDL) **LAB TEST - online**
Week 5 12.10.20	**LITERATURE REVIEW DUE**	Workshop: Writing for Scientific Journals 2 (MDL)	scAb characterisation 3: Cell growth inhibition assays and practical wrap-up (MDL) **LAB TEST - online**
Week 6 19.10.20	Flexibility week	Flexibility week	Flexibility week
Week 7 26.10.20	Guest lecture(s): Development of diagnostics and vaccines for SARS-CoV-2 (TBA)	Feedback session: Literature Review Final exam information	In-class journal article preparation time and peer review (online small groups with MDL)
Week 8 2.11.20	**JOURNAL ARTICLES DUE**	Guest lecture: Tissue engineering and regenerative medicine 1 (MLord)	No lab - final assessment preparation time
Week 9 9.11.20	Final exam information – Q& A	Guest lecture: Tissue engineering and regenerative medicine 2 – activity (MLord)	No lab - final assessment preparation time
Week 10 16.11.20	No lecture Final assessment preparation	Course wrap-up (MDL) MyExperience	Feedback session: Journal Articles (dry lab) Q&A session (MDL)

SYNCHRONOUS online session; ASYNCHRONOUS online session; F2F or SYNCHRONOUS online session.

MDL - Megan Lenardon; MZ – Mahdi Zerrati; MLord – Megan Lord; TBA – to be advised

5. Assessment

5.1 Assessment tasks

Assessment task	Weighting	Due date	Mark and feedback
Assessment 1: LITERATURE REVIEW A 1,500 word review on monoclonal antibody approaches to cancer therapy.	25%	Monday 12 October 2020 (Week 5)	Marks with written and verbal feedback will be provided in the Wednesday lecture in week 7.
Assessment 2: LAB TESTS Four online multiple-choice tests examining understanding of the aims, methods, data analysis and conclusions for four practical sessions.	20% total (4 x 5%)	Window for completion of lab test: Wk 2 practical: 25 Sept – 1 Oct 2020 Wk 3 practical: 2 Oct – 8 Oct 2020 Wk 4 practical: 9 Oct – 15 Oct 2020 Wk 5 practical: 16 Oct – 26 Oct 2020	Students will be required to complete the test for each of the four practical classes before the start of the next practical class. Marks will be available at the completion of each online test.
Assessment 3: JOURNAL ARTICLE At the end of the practical, the work will be written up in the format of a scientific journal article suitable for publication in the *Journal of Fungi*.	25%	Monday 2 November 2020 (Week 8)	Peer assessment of drafts and discussion with the course coordinator will occur online in small groups in the online practical session in week 7. Marks with written and verbal feedback will be provided in the practical class in week 10.
Assessment 4: FINAL ASSESSMENT The final assessment will consist of one 2,500 word essay based on the guest lecture material presented in weeks 7-9.	30%	Friday 27 November 2020 (this is in the T3 Exam period, but it is not an exam)	This assessment replaces a final exam for this course. Students will have the opportunity to discuss material with the course coordinator in Q&A sessions in weeks 9 & 10.

Full details of the assessment tasks will be provided during the lectures and practical classes, and via Moodle. Submission details are outlined in Section 5.3 of this document.

5.2 Assessment criteria and standards

The following descriptors can be used as a guide when completing the assessments tasks for this course. Assessment-specific rubrics will be provided for each assessment via Moodle.

Description	Mark
HIGH DISTINCTION: outstanding work, showing thorough understanding; discrimination in the use of information and strong analytical ability; evidence of extensive use of original literature *Answer/essay well-structured with excellent style and appropriate diagrams integrated with the text. Seamless integration of material from different elements of the course.* *Excellent practical ability and superior understanding. Extensive knowledge of background literature. Excellent analytical ability. Extremely well-presented report with clear diagrams and figures, appropriate references and well thought out conclusions.*	85-100
DISTINCTION: work showing very good synthesis of concepts, in itself evidence of critical reading *Answer/essay well-structured with very good style and appropriate diagrams integrated with the text. Very good integration of material from different elements of the course.* *Very good practical and analytical ability and very good understanding. Evidence of wider reading and very good level of background knowledge of the topic. Very well-presented report with adequate figures, diagrams, references and appropriate conclusions.*	75-84
CREDIT: work showing good understanding of the critical concepts; work drawn largely from lecture material and from a limited selection of the literature; good use of examples *Marks at the upper end of this range for integration of material from different elements of the course. Marks deducted for minor errors.* *Good level of practical ability and understanding, main aspects are understood. Good level of background knowledge of the topic. Good analytical ability. Good report.*	65-74
PASS: reasonable attempt at addressing the question but showing limited understanding and/or knowledge *Few illustrative examples; important facts omitted or lacking breadth.* *Satisfactory level of practical ability and understanding. Adequate level of background knowledge of the topic. Satisfactory analytical ability. Satisfactory report.*	50-64
FAIL: a poor answer that shows some relevant knowledge but lacks focus on the central questions, or is seriously lacking in content and accuracy *Other major shortcomings, such as inaccuracy, random rather than selected content, material largely irrelevant to the question, poor presentation.* *Limited practical ability. Only partial grasp of concepts and proneness to inaccuracy. Limited knowledge of background literature. Limited appreciation of subject. Weak analytical ability. Poorly written report containing some misconceptions.*	0-49

5.3 Submission of assessment tasks

Electronic copies of your Literature Review, Journal Article and Final Assessment should be submitted online via the appropriate Turnitin Assignment link on Moodle before the appropriate deadline. You are not required to submit a hard (paper) copy. Lab Tests will be online and accessible via Moodle. Students will have one hour to complete each lab test and will be limited to one attempt per test.

Special consideration - Term 3 2020

Special consideration is the process for assessing the impact of short-term events beyond your control (exceptional circumstances), on your performance in a specific assessment task.

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

You must apply for special consideration before a piece of assessment is due, except where illness or misadventure prevent you from doing so. If your circumstances stop you from applying before your assessment due date, you must apply within 3 working days of the assessment or the period covered by your supporting documentation.

You must obtain supporting documentation before submitting the application.

If you experience a technical issue during an online test, you should take screenshots of as many of the following as possible:

- error messages
- screen not loading
- timestamped speed tests
- power outage maps
- messages or information from your internet provider regarding the issues experienced

All screenshots must include the date and time the issue occurred.

Please make contact with the Course Coordinator immediately and advise them of the issue, and then submit a Special Consideration application immediately at the conclusion of the lab test and upload your screenshots.

HOW TO APPLY: The application must be made through the Special Consideration portal on myUNSW: https://iaro.online.unsw.edu.au/special_consideration/home.login. Students will be contacted via their official university email as to the outcome of their application.

Further information on special consideration can also be found at https://student.unsw.edu.au/special-consideration.

5.4. Feedback on assessment

Literature Review and Journal Article

General feedback to the class will be provided verbally by the course coordinator in designated feedback sessions in weeks 7 and 10. Written feedback on individual assignments will also be provided to each student during these feedback sessions.

Prior to the submission of the Journal Article, students who have prepared a draft of their manuscripts can participate in an online peer review session in the practical class in week 7. Further details will be provided during the practical classes and via Moodle.

6. Academic integrity, referencing and plagiarism

Plagiarism is the presentation of the thoughts or work of another as one's own. Examples[11] include:

- direct duplication of the thoughts or work of another, including by copying work, or knowingly permitting it to be copied. This includes copying material, ideas or concepts from a book, article,

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

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[22].

Submitting an assessment item that has already been submitted for academic credit elsewhere may also be considered plagiarism.

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

Students are reminded of their Rights and Responsibilities in respect of plagiarism, as set out in the University Undergraduate and Postgraduate Handbooks, and are encouraged to seek advice from academic staff whenever necessary to ensure they avoid plagiarism in all its forms.

More information on plagiarism can be located at the *Current Students* site https://student.unsw.edu.au/plagiarism

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.

In this course, students are expected to adopt the referencing style used in the journal called "*Journal of Fungi*". Details are found in the *Manuscript Preparation* section of the *Instructions for Authors* on the journal web site: https://www.mdpi.com/journal/jof/instructions, with detailed information available in the *Reference List and Citation Guide* (download from https://www.mdpi.com/authors/references).

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

The Learning & Career Hub 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: see https://student.unsw.edu.au/individual-consultations-academic-support

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.

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[3]. At UNSW, this means that your work must be your own, and others' ideas should be appropriately acknowledged. If you do not follow these rules, plagiarism may be detected in your work.

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[2] Adapted with kind permission from the University of Melbourne

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

Further information about academic integrity can be located at: https://student.unsw.edu.au/aim

Further resources are available to assist you to understand your conduct obligations as a student: https://student.unsw.edu.au/conduct.

7. Readings and resources

Text Book

Due to the broad range of topics covered in Medical Biotechnology, there is no single textbook that encompasses everything. Additional materials or links to scientific literature will be provided by individual lecturers. The following is a good source of background information to accompany the lectures. It is available for purchase from the UNSW Bookshop (https://www.bookshop.unsw.edu.au/) and in the Library:

Medical Biotechnology (2014)
Bernard R. Glick, Terry L. Delovitch, Cheryl L. Patten
ASM Press: Washington DC

Course Manuals

A pdf document of the course outline and practical manual will be made available to students via Moodle.

Literature searching

PubMed can be used to search for and access peer-reviewed scientific literature:
http://www.ncbi.nlm.nih.gov/pubmed

UNSW Library

http://www.library.unsw.edu.au

8. Administrative matters

Biosciences Student Office

The Biosciences Student Office is the central point of contact for all enquiries relating to undergraduate study in the School of Biotechnology and Biomolecular Sciences
Contact via the WebForm: https://www.unsw.to/webforms

Equitable Learning Services

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to register with Equitable Learning Services (https://student.unsw.edu.au/els) and discuss their study needs with the course coordinator prior to, or at the commencement of, their course. 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.

Continual Course Improvement

Periodically, student evaluative feedback on this course is gathered, using the University's the online student survey (MyExperience). Student feedback is taken seriously, and continual improvements are made to the course based in part on such feedback. Significant changes to the course will be communicated to subsequent cohorts of students taking the course. Please complete the MyExperience evaluations and provide us with your feedback.

The course underwent significant revision in 2018:

- A new practical was introduced to the course in 2018 to better align the activity with the course learning outcomes.

- The lecture series was re-ordered and streamlined so that content relevant to the assessment tasks was delivered at an appropriate time, and in a more cohesive order.
- The weighting of the final exam was reduced from 50% to 30% and the amount of material examined was reduced to take pressure off students at the end of semester.
- Workshops were introduced to better explain to students what was required of them in terms of the literature review, journal article and lab book.
- Feedback sessions were introduced to more effectively communicate with students.

Student feedback from 2018 was extremely positive. Minor changes were made to the course in 2019 to adjust for the introduction of the 3+ Academic Calendar:

- Some of the introductory material relating to the practical class was delivered in the lecture slots, rather than in the practical slots.
- The lectures on “Tissue engineering and regenerative medicine” by A/Prof Megan Lord were delivered concurrently to BABS3061 and BIOM9333 (Graduate School of Biomedical Engineering) students.
- The Literature Review assessment was made shorter and more focussed.
- Assessment-specific rubrics were provided for each assessment via Moodle before each assessment was due.

Student feedback from 2019 was again extremely positive. Minor revisions to the course have been made in 2020 based on student feedback from 2019, as well as some major revisions due to the introduction of week 6 flexibility week and the ongoing COVID-19 pandemic:

- The number of face-to-face (F2F) practical sessions has been reduced from five to four. Students have been given the option of completing the practical component either F2F or online. Dry lab material presented F2F in previous years will be presented online.
- Four online lab tests, each worth 5% of the final mark, have replaced the assessment of the laboratory notebook (previously worth 15% of the final mark). This is to ensure consistency in the assessment for students completing the practical component online or F2F.
- The number of non-monoclonal antibody topics (guest lectures) that will be covered in the course has been reduced. A new topic “development of diagnostics and vaccines for SARS-CoV-2) has been added.
- The weighting of the journal article has been reduced from 30% to 25% and the amount of time that students will have to complete this assessment task after the practical classes finish has been increased by one week.
- The final exam has been replaced with a final assessment. Instead of writing one essay in a two-hour exam, students will be given time to prepare their essay in class and submit via Turnitin at the start of the T3 exam period.

9. Additional support for students

- The Current Students Gateway: https://student.unsw.edu.au/
- Academic Skills Support: https://student.unsw.edu.au/skills
- Student Wellbeing & Health: https://student.unsw.edu.au/wellbeing
- Equitable Learning Services (ELS): https://student.unsw.edu.au/els
- Student Counselling & Psychological Services (CAPS): https://student.unsw.edu.au/counselling
- UNSW IT Service Centre: https://www.myit.unsw.edu.au/services/students