



UNSW

UNSW Course Outline

BABS3631 Biotechnology & Bioengineering Advanced - 2024

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General Course Information

Course Code : BABS3631

Year : 2024

Term : Term 2

Teaching Period : T2

Is a multi-term course? : No

Faculty : Faculty of Science

Academic Unit : School of Biotechnology and Biomolecular Sciences

Delivery Mode : Multimodal

Delivery Format : Standard

Delivery Location : Kensington

Campus : Sydney

Study Level : Undergraduate

Units of Credit : 6

Useful Links

[Handbook Class Timetable](#)

Course Details & Outcomes

Course Description

In order to bring new biotechnology products to the market, scalable bioprocesses must be developed and validated. This course covers the bioprocessing and economic principles involved in the operation, development and design of large-scale biotechnology-based processes. It

includes analysis of fermentation kinetics, batch and continuous modes of operation, bioprocess optimisation, principles of fermentor scale up, downstream processing and bioprocess design, as well as principles of economic feasibility analysis. Selected bioprocesses will be used to develop an understanding of fundamental bioprocessing principles, including process scale-up. Examples will be drawn from major biotechnology sectors, including biofuels, biopharmaceutical manufacture and manufacture of other bioproducts from bacterial, yeast and mammalian hosts. Laboratory sessions and problem-solving tutorials (including computer-based classes) will supplement lecture material. At least one detailed case study will be undertaken by students which will investigate economic and technical feasibility of a bioprocess.

BABS3631 is taught in tandem with BABS3031 Biotechnology and Bioengineering and includes extra assignment tasks and an extra lab component that extends students' knowledge in one or more current areas of bioprocessing. This advanced version of the course is intended for students undertaking the Advanced Science program.

Course Aims

This course aims to provide students with an understanding of:

- basic biochemical engineering flowsheets
- the concept of bioprocess flowsheets and mass balances
- the principles of the design and operation of major units involved in the manufacture of biotechnology products
- the impact of modern bioscience disciplines in biotechnology.

Students will attain knowledge and insight into the bioengineering principles required to develop processes for real-world application of biotechnology innovation.

Relationship to Other Courses

This is a core course for the Biotechnology program 3053 and the BABS Biotechnology Major. It integrates learnings from other disciplines (e.g. Microbiology, Biochemistry and Cell Biology) with a focus on process development to make biotechnology products.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Competently apply quantitative methods in biotechnology and bioprocessing to the design and analysis of bioprocess flowsheets and unit operations within.
CLO2 : Apply basic bioengineering principles to fermentation and downstream bioprocessing through tutorial work and assessment items.
CLO3 : Describe and apply knowledge of basic analysis and design of bioprocessing units to undertake defined tasks.
CLO4 : Describe and evaluate the technical, social, economic and ethical issues involved in building a processing plant to manufacture a biological product from fermentation and cell culture processes or through use of enzymes.
CLO5 : Demonstrate extended knowledge in one or more areas of bioprocessing through scientific report writing on a specialised project topic.

Course Learning Outcomes	Assessment Item
CLO1 : Competently apply quantitative methods in biotechnology and bioprocessing to the design and analysis of bioprocess flowsheets and unit operations within.	<ul style="list-style-type: none">• Term Test• Final Exam
CLO2 : Apply basic bioengineering principles to fermentation and downstream bioprocessing through tutorial work and assessment items.	<ul style="list-style-type: none">• Laboratory Work - Report• Term Test• Final Exam
CLO3 : Describe and apply knowledge of basic analysis and design of bioprocessing units to undertake defined tasks.	<ul style="list-style-type: none">• Major Assignment• Laboratory Work - Report
CLO4 : Describe and evaluate the technical, social, economic and ethical issues involved in building a processing plant to manufacture a biological product from fermentation and cell culture processes or through use of enzymes.	<ul style="list-style-type: none">• Major Assignment• Term Test• Final Exam
CLO5 : Demonstrate extended knowledge in one or more areas of bioprocessing through scientific report writing on a specialised project topic.	<ul style="list-style-type: none">• Major Assignment

Learning and Teaching Technologies

Moodle - Learning Management System | Blackboard Collaborate

Learning and Teaching in this course

Lectures online via Collaborate Ultra

Lab/tutorial classes in person, on Wednesdays

Additional Course Information

Nil

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Term Test Assessment Format: Individual	20%	Start Date: 26/06/2024 10:00 AM Due Date: Not Applicable Post Date: 10/07/2024 12:00 AM
Laboratory Work - Report Assessment Format: Individual Short Extension: Yes (7 days)	26%	Start Date: Not Applicable Due Date: Week 10: 29 July - 04 August Post Date: 16/08/2024 12:00 AM
Major Assignment Assessment Format: Individual	24%	Start Date: 03/06/2024 12:00 AM Due Date: Week 8: 15 July - 21 July Post Date: 02/08/2024 12:00 AM
Final Exam Assessment Format: Individual	30%	Start Date: Not Applicable Due Date: Scheduled in the Exam Period

Assessment Details

Term Test

Assessment Overview

This assessment consists of a single mid term test in Week 5. The test will be conducted online and consist of both quantitative and qualitative questions on syllabus topics. The test will cover material presented in weeks 1-4 respectively. The questions will be a combination of multiple choice and short answer.

The test will be invigilated and held on-campus.

Marks and feedback will be released online in Moodle. The solutions will be visited in class.

Course Learning Outcomes

- CLO1 : Competently apply quantitative methods in biotechnology and bioprocessing to the design and analysis of bioprocess flowsheets and unit operations within.
- CLO2 : Apply basic bioengineering principles to fermentation and downstream bioprocessing through tutorial work and assessment items.
- CLO4 : Describe and evaluate the technical, social, economic and ethical issues involved in building a processing plant to manufacture a biological product from fermentation and cell

culture processes or through use of enzymes.

Detailed Assessment Description

Covers all material covered in Weeks 1-4

Assessment Length

Not applicable

Submission notes

Done on Inspera

Assessment information

Test will be done in the lab class in week 5

This will be an open-book test done in class, on the student's personal laptops, using a Safe Exam Browser

Assignment submission Turnitin type

This is not a Turnitin assignment

Laboratory Work - Report

Assessment Overview

The assignment will comprise a written report on the three wet labs performed over Weeks 4-9. Reports are typically 20-30 pages, including figures and tables. Your discussion and interpretation of each lab component will be guided by specific questions.

The assignment details will be released in Week 4.

Electronic report submission is due in Week 10.

Feedback will be available to you within 10 working days via comments on the marked report.

Course Learning Outcomes

- CLO2 : Apply basic bioengineering principles to fermentation and downstream bioprocessing through tutorial work and assessment items.
- CLO3 : Describe and apply knowledge of basic analysis and design of bioprocessing units to undertake defined tasks.

Detailed Assessment Description

The details will be found in the lab manual posted on the Moodle site

Advanced students will do an extra lab in week 9 and an extra lab activity in Week 4

Assessment Length

2000-3000 words

Submission notes

Via Turnitin

Assessment information

More information in the posted lab manual

Assignment submission Turnitin type

This assignment is submitted through Turnitin and students can see Turnitin similarity reports.

Major Assignment

Assessment Overview

You will work through a series of defined tasks requiring the use of the Berkley Madonna program. Training on the use of the program and how to approach this part of the assignment will be done in Weeks 2 and 3.

The course convenor and/or class tutors will mark this assignment and the assignment will be returned with written feedback. Full details on the assignment will be provided in the course manual and via the Moodle site in Week 1.

Electronic submission is due in Week 8.

Course Learning Outcomes

- CLO3 : Describe and apply knowledge of basic analysis and design of bioprocessing units to undertake defined tasks.
- CLO4 : Describe and evaluate the technical, social, economic and ethical issues involved in building a processing plant to manufacture a biological product from fermentation and cell culture processes or through use of enzymes.
- CLO5 : Demonstrate extended knowledge in one or more areas of bioprocessing through scientific report writing on a specialised project topic.

Detailed Assessment Description

See posted Assignment manual

Assessment Length

1000-3000 words

Submission notes

Submit via Turnitin

Assessment information

This requires you to have a working copy of the program Berkley Madonna. The key license is here

name	operating system	version	key
UNSW-2024	Windows/macOS/Linux	10	6107-8002-9453-8879-2024

Assignment submission Turnitin type

This assignment is submitted through Turnitin and students can see Turnitin similarity reports.

Final Exam

Assessment Overview

In this examination you will undertake quantitative and qualitative questions which will cover materials delivered in weeks 5-10, covering concepts in lectures, tutorials and labs.

The 2h examination will be held in the normal examination period, on campus and be invigilated.

Feedback is available through direct consultation with the Course Convenor.

Course Learning Outcomes

- CLO1 : Competently apply quantitative methods in biotechnology and bioprocessing to the design and analysis of bioprocess flowsheets and unit operations within.
- CLO2 : Apply basic bioengineering principles to fermentation and downstream bioprocessing through tutorial work and assessment items.
- CLO4 : Describe and evaluate the technical, social, economic and ethical issues involved in building a processing plant to manufacture a biological product from fermentation and cell culture processes or through use of enzymes.

Detailed Assessment Description

Test will be done on campus

This will be an open-book test done in class, on the student's personal laptops, using a Safe Exam Browser

Assessment Length

Not applicable

Submission notes

Done on Inspera

Assessment information

Will cover content from Week 5-10 inclusive

Assignment submission Turnitin type

Not Applicable

General Assessment Information

All details to be provided on the Moodle site

Grading Basis

Standard

Requirements to pass course

An overall mark of 50 or greater

Course Schedule

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

General Schedule Information

Lectures online: Mondays 10-12 and Tuesdays 11-12

Lab classes (one of): Wednesday 10-1 or Wednesday 2-5

Course Resources

Prescribed Resources

Provided Lecture notes and Readings

Short videos to describe lab and assignment tasks

Video solutions to tutorial questions

Recommended Resources

Resources provided on the Moodle site

Additional Costs

Nil

Course Evaluation and Development

The course has been redesigned based on student feedback:

1. Reduced Assessment load

- We have gone from 2 sessional quizzes to one mid-term quiz
- The Assignment formerly had two parts: it now has only one component, expanded by about 20% in 2024

2. Redesign of Lecture Notes and Other Resources

- Clearer goals and aims for each lecture
- Readings supplied directly on Moodle

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Facilitator in charge	Christopher M arquis		320A D26	0293852898	By appointment	No	Yes

Other Useful Information

Academic Information

Upon your enrolment at UNSW, you share responsibility with us for maintaining a safe, harmonious and tolerant University environment.

You are required to:

- Comply with the University's conditions of enrolment.
- Act responsibly, ethically, safely and with integrity.

- Observe standards of equity and respect in dealing with every member of the UNSW community.
- Engage in lawful behaviour.
- Use and care for University resources in a responsible and appropriate manner.
- Maintain the University's reputation and good standing.

For more information, visit the [UNSW Student Code of Conduct Website](#).

Academic Honesty and 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.

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. 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, plagiarism and the use of AI in assessments can be located at:

- The [Current Students site](#),
- The [ELISE training site](#), and
- The [Use of AI for assessments](#) site.

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

Submission of Assessment Tasks

Penalty for Late Submissions

UNSW has a standard late submission penalty of:

- 5% per day,
- for all assessments where a penalty applies,
- capped at five days (120 hours) from the assessment deadline, after which a student cannot submit an assessment, and
- no permitted variation.

Any variations to the above will be explicitly stated in the Course Outline for a given course or assessment task.

Students are expected to manage their time to meet deadlines and to request extensions as early as possible before the deadline.

Special Consideration

If circumstances prevent you from attending/completing an assessment task, you must officially apply for special consideration, usually within 3 days of the sitting date/due date. You can apply by logging onto myUNSW and following the link in the My Student Profile Tab. Medical documentation or other documentation explaining your absence must be submitted with your application. Once your application has been assessed, you will be contacted via your student email address to be advised of the official outcome and any actions that need to be taken from there. For more information about special consideration, please visit: <https://student.unsw.edu.au/special-consideration>

Important note: 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 and cannot later apply for Special Consideration. This is to ensure that if you feel unwell or are faced with significant circumstances beyond your control that affect your ability to study, you do not sit an examination or submit an assessment that does not reflect your best performance. Instead, you should apply for Special Consideration as soon as you realise you are not well enough or are otherwise unable to sit or submit an assessment.

Faculty-specific Information

Additional support for students

- [The Current Students Gateway](#)
- [Student Support](#)
- [Academic Skills and Support](#)
- [Student Wellbeing, Health and Safety](#)
- [Equitable Learning Services](#)
- [UNSW IT Service Centre](#)
- Science EDI Student [Initiatives](#), [Offerings](#) and [Guidelines](#)