School of Environmental and Life Sciences

BTEC1000: Introduction to the Biotechnology Sector

Callaghan

Semester 1 - 2024

COURSE OUTLINE

OVERVIEW

Course Description

Worldwide, the Biotechnology sector is the fastest growing of the scientific sectors. BTEC1000 introduces students to the Biotechnology sector, the range of industries and professions that make up this broad and diverse sector, as well as to present an overview of the key scientific, technological, social, environmental and economic drivers of the Biotechnology sector. There is also a strong focus on the emerging Biotechnologies that are transforming the Biotechnology sector, and society more broadly, through addressing key health, agricultural and environmental challenges. Knowledge of the structure and organisation of the Biotechnology sector will be developed through an emphasis on the role of innovation, technological and scientific advances, intellectual property protection, and the business models that exploit the commercial potential of Biotechnology and take new discoveries to the market place. Students will acquire basic knowledge of how patents work, clinical trials operate in drug discovery and development, and how individual companies operate in the Biotechnology space. Basic skills will be acquired in discovering, analysing and presenting information about the innovation, Research and Development, emerging technologies, intellectual property, businesses and commercialisation in the Biotechnology Sector. The course will set the scene for the development of these themes in more detail in later years of the Bachelor of Biotechnology Program.

Academic Progress Requirements

Nil

Requisites

This course is only available to students enrolled in the Bachelor of Biotechnology [10981] or Diploma of Science [40318] programs.

Contact Hours

Callaghan
Computer Lab
Face to Face On Campus
1 hour(s) per week(s) for 12 week(s)

Lecture
Face to Face On Campus
2 hour(s) per week(s) for 12 week(s)

Unit Weighting Workload

10
Students are required to spend on average 120-140 hours of effort (contact and non-contact) including assessments per 10 unit course.

CONTACTS

Course Coordinator

Callaghan
Dr John Schjenken
John.Schjenken@newcastle.edu.au
Consultation: Via email to arrange appointment

Teaching Staff

Other teaching staff will be advised on the course Canvas site.

School Office

School of Environmental and Life Sciences
Room C228 Chemistry Building
Callaghan
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+61 2 4921 5080
9am-5pm (Mon-Fri)

SYLLABUS

Course Content

1. What is Biotechnology? The structure and organisation of the Biotechnology Sector.
2. Overview of the existing Biotechnology sector, namely; health, agriculture and the environment.
3. Emerging Biotechnologies such as stem cells, synthetic biology, next generation genomics and personalised medicine; next generation pharmaceuticals and immunotherapies; big data and bioinformatics.
4. Intellectual Property: the most valuable assist of the Biotechnology sector; IP protection and its relation to profitability through the patent system; practical tools for researching IP.
5. Business models of Biotechnology companies.
6. Steps involved in the commercialisation of Biotechnologies.
7. Funding early through to late stage Biotechnology commercialisation; venture capital, start-ups, licencing agreements, debt and equity.
8. Product testing and regulatory approval, including; Clinical Trials.
9. Good Manufacturing Practice, Quality Assurance and Quality Control; product liability; sales and marketing.
10. Researching and report writing for Biotechnology

Course Learning Outcomes

On successful completion of this course, students will be able to:

1. Demonstrate knowledge of the organisation and complexity of the Biotechnology Sector, including the role this sector plays in addressing problems and exploiting commercial opportunities in human health, agriculture and the environment.
2. Demonstrate a basic familiarisation with major areas of Biotechnology, including pharmaceuticals and disease therapies, plant, animal, reproductive, fermentation and environmental technologies, and the continually evolving area of innovation in the Biotechnology sector.
3. Demonstrate knowledge on the significance of Intellectual Property and the patents system to the Biotechnology sector, and display a practical working knowledge of accessing, searching and interpreting patent databases.
4. Display basic knowledge of the critical steps involved in the commercialisation of Biotechnology, including; innovation, Research and Development, intellectual property protection, product testing, licencing and regulatory approval, raising and allocating capital.
5. Demonstrate basic skills in acquiring and presenting information on the business model and technology of individual companies in the biotechnology sector, including summarising and presenting this information through written reports.

Course Materials

Lecture Materials:

- All assessable content will be provided in lecture or tutorial material

Recommended Text:

Introduction to Biotechnology, Global Edition, Thieman and Palladino, 2019, Fourth Edition.

- Available from the Library and Online [through library website]

SCHEDULE

Week	Week Begins	Topic	Learning Activity	Assessment Due
1	26 Feb	Introduction to Biotechnology Sector	Lectures/Tutorial (Computer Lab)	
2	4 Mar	DNA, PCR, Recombinant Organisms; Microbial Biotechnology	Lectures/Tutorial (Computer Lab)	
3	11 Mar	Drug Discovery and Clinical Trials; Microbial Biotechnology	Lectures/Tutorial (Computer Lab)	Online quiz; week 3; Due Friday 08/03/2024
4	18 Mar	Industrial Biotechnology; Microbial Biotechnology	Lectures/Tutorial (Computer Lab)	
5	25 Mar	Careers in Biotechnology: QA/QC; Oncolytic Immunotherapy	Lectures/Tutorial (Computer Lab)	Online quiz; week 5; Due Thursday 28/03/2024
6	1 Apr	Intellectual Property/Patents	Lectures/Tutorial (Computer Lab)	
7	8 Apr	Commercialisation; Reproductive Biotechnology	Lectures/Tutorial (Computer Lab)	Report for IP Assessment; Due Friday 12/04/2024
Mid-Semester Recess				
Mid-Semester Recess				
8	29 Apr	Reproductive Biotechnology	Lectures/Tutorial (Computer Lab)	Online quiz, week 8; Due Friday 03/05/2024
9	6 May	Biotechnology Industry Lecture; Plant Biotechnology	Lectures/Tutorial (Computer Lab)	Online quiz; week 9; Due Friday 10/05/2024
10	13 May	Biotechnology Industry Lecture; Plant Biotechnology	Lectures/Tutorial (Computer Lab)	Biotechnology Innovation Proposal; Due Friday 17/05/2024
11	20 May	Biotechnology Industry Lecture; Plant Biotechnology	Lectures/Tutorial (Computer Lab)	Online quiz; week 11; Due Friday 24/05/2024 Biotechnology Innovation Seminars (in tutorial)
12	27 May	Careers in Biotechnology	Lectures/Tutorial (Computer Lab)	Biotechnology Innovation Seminars (in tutorial)
13	3 Jun	Revision lectures	Revision lecture	
Examination Period				
Examination Period				

ASSESSMENTS

This course has 4 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Seminars	Students will be assigned to present in tutorial during weeks 11 and 12	Individual	15%	1, 2, 3, 4, 5
2	Online Quizzes	Weeks 3, 5, 8, 9, and 11	Individual	20%	1, 2, 3, 4, 5
3	Examination	Examination period, end of semester	Individual	30%	1, 2, 3, 4
4	Reports	Report 1: Week 7 Report 2: Week 10	Individual	35%	1, 2, 3, 4, 5

Late Submissions The mark for an assessment item submitted after the designated time on the due date, without an approved extension of time, will be reduced by 10% of the possible maximum mark for that assessment item for each day or part day that the assessment item is late. Note: this applies equally to week and weekend days.

Assessment 1 - Seminars

Assessment Type Presentation
Purpose Presentation on a biotechnology idea or innovation
Description Students will work in small groups and present on a collective idea for a biotechnology innovation or product that could be of commercial, therapeutic (e.g., drug) or environmental significance
Weighting 15%
Length Details available on Canvas
Due Date Students will be assigned to present in tutorial during weeks 11 and 12
Submission Method In Class
Assessment Criteria Assessment criteria will be available on Canvas
Return Method In Class
Feedback Provided In Class - .
Opportunity to Reattempt Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 2 - Online Quizzes

Assessment Type In Term Test
Purpose To test knowledge of course material progressively through the semester
Description Online, multiple choice quiz
Weighting 20%
Length 1 hour, once accessed online
Due Date Weeks 3, 5, 8, 9, and 11
Submission Method Online
Assessment Criteria Multiple choice answers are correct or incorrect
Return Method Not Returned
Feedback Provided In Class - Week After quizzes.
Opportunity to Reattempt Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 3 - Examination

Assessment Type	Formal Examination
Purpose	Formal Examination
Description	2 hour examination of the course content in the examination period
Weighting	30%
Length	2 hours
Due Date	Examination period, end of semester
Submission Method	Formal Exam
Assessment Criteria	Written examination will examine knowledge of course content
Return Method	Not Returned
Feedback Provided	No Feedback
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 4 - Reports

Assessment Type	Report
Purpose	Reports allow students to integrate knowledge of the course and prepare written reports on core topics
Description	Reports cover; 1. Intellectual Property and Patents 2. Biotechnology Innovation Proposal
Weighting	35%
Length	Report length and format available via Canvas
Due Date	Report 1: Week 7 Report 2: Week 10
Submission Method	Online
Assessment Criteria	Assessment criteria for each report will be available on Canvas
Return Method	Online
Feedback Provided	Online - Within 2 weeks of submission.
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

ADDITIONAL INFORMATION

Grading Scheme

This course is graded as follows:

Range of Marks	Grade	Description
85-100	High Distinction (HD)	Outstanding standard indicating comprehensive knowledge and understanding of the relevant materials; demonstration of an outstanding level of academic achievement; mastery of skills*; and achievement of all assessment objectives.
75-84	Distinction (D)	Excellent standard indicating a very high level of knowledge and understanding of the relevant materials; demonstration of a very high level of academic ability; sound development of skills*; and achievement of all assessment objectives.
65-74	Credit (C)	Good standard indicating a high level of knowledge and understanding of the relevant materials; demonstration of a high level of academic achievement; reasonable development of skills*; and achievement of all learning outcomes.
50-64	Pass (P)	Satisfactory standard indicating an adequate knowledge and understanding of the relevant materials; demonstration of an adequate level of academic achievement; satisfactory development of skills*; and achievement of all learning outcomes.
0-49	Fail (FF)	Failure to satisfactorily achieve learning outcomes. If all compulsory course components are not completed the mark will be zero. A fail grade may also be awarded following disciplinary action.

*Skills are those identified for the purposes of assessment task(s).

Attendance

Attendance/participation will be recorded in the following components:

- Computer Lab (Method of recording: Via UON online downloadable app)

As this is a first year course, there is a compulsory 80% attendance requirement

Communication Methods

Communication methods used in this course include:

- Canvas Course Site: Students will receive communications via the posting of content or announcements on the Canvas course site.
- Email: Students will receive communications via their student email account.
- Face to Face: Communication will be provided via face to face meetings or supervision.

Course Evaluation

Each year feedback is sought from students and other stakeholders about the courses offered in the University for the purposes of identifying areas of excellence and potential improvement.

Oral Interviews (Vivas)

As part of the evaluation process of any assessment item in this course an oral examination (viva) may be conducted. The purpose of the oral examination is to verify the authorship of the material submitted in response to the assessment task. The oral examination will be conducted in accordance with the principles set out in the Oral Examination (viva) Procedure. In cases where the oral examination reveals the assessment item may not be the student's own work the case will be dealt with under the Student Conduct Rule.

Academic Misconduct

All students are required to meet the academic integrity standards of the University. These standards reinforce the importance of integrity and honesty in an academic environment. Academic Integrity policies apply to all students of the University in all modes of study and in all locations. For the Student Academic Integrity Policy, refer to https://policies.newcastle.edu.au/document/view-current.php?id=35.

Adverse Circumstances

The University acknowledges the right of students to seek consideration for the impact of allowable adverse circumstances that may affect their performance in assessment item(s).

Applications for special consideration due to adverse circumstances will be made using the online Adverse Circumstances system where:

1. the assessment item is a major assessment item; or
2. the assessment item is a minor assessment item and the Course Co-ordinator has specified in the Course Outline that students may apply the online Adverse Circumstances system;
3. you are requesting a change of placement; or
4. the course has a compulsory attendance requirement.

Before applying you must refer to the Adverse Circumstance Affecting Assessment Items Procedure available at:
https://policies.newcastle.edu.au/document/view-current.php?id=236

Important Policy Information

The Help button in the Canvas Navigation menu contains helpful information for using the Learning Management System. Students should familiarise themselves with the policies and procedures at https://www.newcastle.edu.au/current-students/respect-at-uni/policies-and-procedures that support a safe and respectful environment at the University.

Other Information

Reasonable Adjustment Plans (RAP) If you are registered with AccessAbility and have been provided with a RAP, please ensure that you provide your Course Coordinator with a copy as soon as you can, or let your Course Coordinator know that you are still waiting for your RAP.

This course outline was approved by the Head of School. No alteration of this course outline is permitted without Head of School approval. If a change is approved, students will be notified and an amended course outline will be provided in the same manner as the original.