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INTRODUCTION

Welcome to Biotechnology 631.

Biotechnology uses naturally occurring, and modified versions of biological processes, for the achievement of technical processes. This can be for the benefit of society as a whole, but can also form the basis for business and commercial developments. Globally, the use of biotechnology plays a role in industrial, environmental, social, medical, and commercial applications of science. It encompasses many different scientific disciplines, in processes such as the development of pharmaceuticals, medical devices and diagnostic systems for human and animal health, development of new or improved technologies for medicine, agriculture, animal and plant breeding, pest control, biosecurity, forensic investigation, and in a wide variety of processing and manufacturing industries.

What is generally referred to as "modern biotechnology" arose through the development of recombinant DNA methods (genetic manipulation) in the late 1970s. However, biotechnology includes many other areas of science, including the use of living organisms to achieve specific medical, industrial, or environmental goals, the production of enzymes and monoclonal antibodies, cell nuclear transfer, stem cell growth and differentiation, genomics, and proteomics.

Biotechnology was originally dominated by activity in the USA and Europe, but major programs for biotechnology are now established in many countries. Recent developments in biotechnology have greatly increased its global significance.

ESSENTIAL ADMINISTRATIVE INFORMATION

Unit Title	Biotechnology 631
Unit Description	This unit aims to provide a broad understanding of this rapidly growing area of science, how it is used in various industries, how scientific discoveries become the basis for and providing investigative and manipulative tools in ecology, conservation, medicine, agriculture, and productive systems in businesses and industries. When combined, this provides an understanding of the capabilities and importance of biotechnology for present and future societies.
Unit Study Package Number	310157
Unit Coordinator	Dr Keith Gregg
Teaching Area	Biotechnology and Molecular Biology
Credit Value	25
Mode(s) of study	Internal
Additional requirements	None
Core Unit status	If you are taking this unit as a required (core) unit in your course of study, you may be terminated from your course of study if you fail this unit twice.
Result Type	Grade and Mark
Ancillary Fees and Charges	All fee information can be obtained through the Fees Centre. Visit http://www.fees.curtin.edu.au/index.cfm for details.
Unit Website	You can access the unit materials from FLECS-Blackboard via http://oasis.curtin.edu.au

Faculty or School Website	http://www.biomed.curtin.edu.au/
Tuition Pattern	Lectures: Monday: 2 p.m. – 4 p.m. Tutorials: Friday: 3 p.m. – 5 p.m. Teaching material will be available on FLECS-Blackboard following lectures.
Study Requirements	Questions relating to lectures will be handed out at the lecture and students will be expected to answer those question in the following tutorial. Exam questions will be based on the knowledge needed to answer tutorial questions

TEACHING STAFF

Lecturer and tutor:	Dr Keith Gregg
Email:	K.Gregg@curtin.edu.au
Phone:	9266 7671
Fax:	
Building:	308
Room:	226
Contact Hours:	9 a.m. – 5 p.m. Monday – Friday by appointment

Dr Gregg will assist you with your learning and any problems or difficulties you may experience while undertaking this unit. He will also mark your assignments and provide feedback in relation to your progress in this unit. As Unit Coordinator, Dr Gregg will also deal with administrative aspects of the Unit.

If you wish to leave a message or question for the lecturer, the preferred method is by email, allowing for a response time of up to 2 working days. Direct contact at the office by appointment is welcomed.

UNIT COORDINATOR

In this case, the unit coordinator is also the lecturer for the unit.

UNIT SYLLABUS

Exploration of the biotechnology industry, including traditional forms and recent developments in biotechnology. Examination of how biological processes can be harnessed to perform or supplement technical processes, including their role in developing renewable and sustainable systems for agriculture and industry. Overview of the contemporary biotechnology industry and applications of biopharmaceuticals, transgenics, genomics, proteomics, and monoclonal antibody technology, DNA and protein analysis as diagnostic tools, and rational drug design. Comparisons are made of the biotechnology industry in a selection of different countries. Principles are studied for objective assessment of positive or negative claims and arguments about biotechnology or other areas of science, approaches to decision-making, and for the development of skills for writing clear and precise scientific and other formal documents.

LEARNING OUTCOMES

On successful completion of this unit you will be able to:

1. Evaluate and discuss biotechnology milestones in terms of their roles in the development of modern biotechnology
2. Distill the important information from documents, into a clear and concise summary.
3. Formulate intellectually honest arguments that support or question specific views on scientific topics.
4. Analyse the major factors in evaluation of biotechnological discoveries or developments as potential products and processes across the globe.
5. Argue the international safety, social and ethical issues in the biotechnology industry and products.
6. Collect, evaluate and collate information on biotechnology products to construct clear, concise reports for a scientific audience.

LEARNING ACTIVITIES

Lectures will present information that forms the starting point for self-motivated information gathering.

Tutorials will cover some specific topics, such as scientific writing, valid scientific argument and debating. They will also revise lecture material and the questions that are provided to stimulate thinking and learning about the lecture topics.

Assignments are designed to provide experience in gathering, collating, and analysing information from diverse sources that relates to contradictory arguments. Evaluation of information is an important part of report writing. Style of presentation and the techniques required for clear, concise scientific communication are also covered and assessed.

STUDENT FEEDBACK



For Semester 1 and Semester 2 **eVALUate** is open for student feedback in weeks 12-17.

For other study periods see <http://evaluate.curtin.edu.au/info/dates.cfm>

We welcome and value your feedback as one very important way to keep improving this unit. Later this semester, you will be encouraged to give unit feedback through **eVALUate**, Curtin's online student feedback system (see <http://evaluate.curtin.edu.au>).

LEARNING RESOURCES

Material relevant to the course will be provided as hard-copy at lectures and/or tutorials and in electronic form via FLECS Blackboard. Links to specific online information sources will be provided and general internet searches are encouraged as a way of broadening the range of sources and balancing opinions.

TEXT BOOK

BECAUSE OF THE RAPIDLY DEVELOPING NATURE OF BIOTECHNOLOGY, THERE IS NO SET TEXT-BOOK FOR THIS SUBJECT.

Students are expected to seek the most recent information on each topic via the internet and scholarly databases, with emphasis on demonstrably valid sources of information.

(Hint: Wikipedia can be useful as a starting point for definitions, but **is not regarded as a reliable source on which to base important written information, or decisions**, because of the lack of regulation in editorial alterations)

A wide variety of online text books can be accessed for free at:

<http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?db=Books>

For current developments in biotechnology and its basic research, the monthly journal Nature/Biotechnology is recommended.

Recommended Resources through the www:

A web site covering technical and ethical aspects of biotechnology and molecular biology education can be found at www.actionbioscience.org

United States Biotechnology Industry Organisation <http://www.bio.org>

National Centre for Biotechnology Education (UK) <http://www.ncbe.reading.ac.uk/menu.html>

Biotechnology Education Centre (Biotech Australia) <http://www.biotechnology.gov.au>

National Centre for Biotechnology Information (USA) <http://www.ncbi.nlm.nih.gov/>

National Health Museum (USA) <http://www.accessexcellence.org/>

United States Patent Office <http://www.uspto.gov/>

Australian Stock Exchange <http://www.asx.com.au>

United States Food & Drug Administration (FDA) <http://www.fda.gov>

Australian Therapeutic Goods Administration (TGA) <http://www.tga.gov.au>

Caution!

Google searches can be extremely helpful, but be sure to establish the nature of any website on whose information you may rely.

Not all web-sites are what they seem to be. e.g. the "Vaccination Network" is in fact an anti-vaccination network which provides misleading and in some cases blatantly false information.

You are expected to be able to tell the difference between valid sites and deceptive sites, by establishing which sites provide information based on correct interpretation of reliable scientific literature.

ASSESSMENT DETAILS

Assessment Summary

The assessment for this unit consists of the following items.

Assessment Tasks	marks/100	Due	Unit Learning Outcome Assessed
Article Summary	15	Monday 19 March	2, 6.
Assessment of a Published Article	30	Friday 20 April	2, 3, 4, 6.
Journal Article Analysis	25	Friday 25 May	3, 4, 5, 6.
Final Examination	30	Examination period	1, 2, 3, 4, 5.
TOTAL	100%		

All components of the continuous assessment **must be completed** satisfactorily.

Failure to pass any single component may result in a fail for the unit.

Assignment 1 – Article Summary

Worth: 15%

Due: 11:55 p.m. Monday 19th March

Two articles, on related topics, have been taken from a popular news source. These deal with recent biotechnological developments. Students will summarise the two articles and combine them to form a single summary. This must fall within the specified number of words, in a style suitable for a general scientific audience. The final document must contain all significant scientific facts and must be clear in meaning.

Assignment 1 Marking Criteria

1. Recognition and inclusion of important information
2. Clarity of the final summary
3. Strict adherence to the required word-limit

Tutorial assistance in this task will be provided, including additional information on marking criteria.

Assignment 2 – Analysis of a health-related article

Worth: 30%

Students will be provided with a document that discusses vaccination, from an Australian website. Vaccination is one of the older forms of biotechnology and still very much a key part. The task in this assignment is to examine the principle claims and opinions expressed in this document and to use scientific literature available online to corroborate or contradict the claims. Care should be taken to ensure that sources of support or opposition are acceptable as scientific sources.

Test: at the tutorial 3 p.m. Friday 27th April.

Test Marking Criteria (maximum word limit 2000)

1. Answers reflect full understanding of the claims made by the website.
2. Answers show a clear recognition of supportable scientific opinion.
3. Correct interpretation of any data analysis and results relating to the topics involved.
4. Assessment of the extent to which conclusions are supported by data

More information on marking criteria will be provided with assignment details.

Assignment 3 – Interpretation and analysis of a published article.

Worth: 25%

Test: at the tutorial on Friday 20th May 2012

Students will read the journal article provided and be provided with a series of questions based on that article. Students will then take a test that has questions related to the material covered by the initial questions. These will not be the same questions, but will be on the same material dealt with by those initial questions. Discussion of the questions among students is encouraged, but answers must not show collusion by students or plagiarism of work from other sources.

Assignment 3 Marking Criteria may include:

1. Understanding of the topic involved
2. Understanding of the analytical systems used and what data they provide
3. Analysis of the stated outcomes of the research. Do the data show what the authors claim?
4. Evaluation of the methods used and possible alternative approaches.
5. Clarity and conciseness of answers.

More information on marking criteria will be provided with assignment details.

Referencing Style

Students should use the Chicago referencing style when preparing assignments. More information can be found on this style from the Library web site:

<http://library.curtin.edu.au/referencing/index.html>

Guidelines for Submission:

All assignments should be submitted electronically through FLECS-Blackboard.

Assignment Marking

Marking, release of results, and feedback on written assignments will be completed within 2 weeks of the submission date if possible.

Plagiarism Monitoring

All assignments in this unit will be monitored for plagiarism. For details on what constitutes plagiarism, students should consult the university definitions and policies on: <http://academicintegrity.curtin.edu.au/studentbook.html>, and should consult the booklet that can be downloaded from this site.

Understanding of this concept and policies at Curtin is vital to all students, because they may differ significantly from the policies of other educational institutions.

STUDENTS' RIGHTS AND RESPONSIBILITIES

It is the responsibility of every student to be aware of all relevant legislation, policies and procedures relating to their rights and responsibilities as a student. These include:

- the Student Charter,
- the University's Guiding Ethical Principles,
- the University's policy and statements on plagiarism and academic integrity,
- copyright principles and responsibilities,
- the University's policies on appropriate use of software and computer facilities,
- students' responsibility to check enrolment,
- deadlines, appeals, and grievance resolution,
- student feedback,
- other policies and procedures
- electronic communication with students

See www.students.curtin.edu.au/administration/responsibilities.cfm for comprehensive information on all of the above.

ADDITIONAL INFORMATION

Telephone Contacts:

If you have a query relating to administrative matters such as:-

- requests for deferment of study
- difficulties with accessing online study materials
- obtaining assessment results

You may contact the Unit Coordinator on

9266 7671 or internally extension 7671

However, e-mail contact is preferred because phone calls cannot be answered during meetings or during absence from the office.

Supplementary Examinations

Supplementary examinations are awarded only at the discretion of the Board of Examiners. The aim of a supplementary examination is to allow the student to correct minor problems/deficiencies in the initial assessment and not to gain extra study time or correct major problems.

Note: Supplementary examinations are not automatically awarded. The Board of Examiners will carefully review individual cases. No written application for supplementary examination will be considered.

Supplementary examinations, if awarded, will be indicated on the official Curtin examination result statement posted to all students. A list confirming details will also be placed on the official School Noticeboard. A student who does not sit for a scheduled supplementary examination has no claim to a further examination.

UNIT STUDY CALENDAR

Semester 1 2012

WEEK	START DATE	MODULE:	ASSIGNMENT	DUE DATE
1.	27 Feb	Introduction to Biotechnology The nature of biotechnology and where it began. Overview of the unit, assessment criteria and tasks.	Assignment 1. Summary of News Article	Due 19 March 11:55 pm
2.	5 Mar	The global biotechnology industry Review of the main biotechnology sectors, and companies. A summary of the global picture.		
3.	12 Mar	Scientific debate: avoiding techniques of deception. Assessment of arguments about scientific topics, including biotechnology. How do you decide what to believe or disbelieve?		
4.	19 Mar	Applications of genetic engineering in the modern biotechnology industry. Cell therapeutics and gene therapy Bioprocesses, cell culture and recombinant proteins as therapeutics, transgenic animals and plants. the correction of gene defects associated with genetic diseases	Assignment 1 Submission 11:55 pm Assignment 2. Analysis of a published article	Due 23 April 11:55 pm
5.	26 Mar	Clinical therapies derived from biotechnology. Ways in which biological mechanisms are being applied to healing and repairing tissues and organs. Cellular medicine, embryonic and adult stem cells, gene therapy –		
6.	2 Apr	Application of RNA interference in medical biotechnology Mechanisms of RNA interference, locked nucleic acids, peptide nucleic acids.		

1.	9 Apr	CLASS-FREE WEEK		
2.	16 Apr	Agricultural Biotech, Plants and Animals Agricultural applications of biotechnology; crop and animal biotechnology. Uses of transgenic animals and plants (GMOs or genetically modified organisms) in agriculture.		
3.	23 Apr	Diagnostic Biotechnology Technologies used - immunoassays and DNA/RNA analysis technologies. Applications and technologies for quality control, genetic screening and selection. DNA and protein chips, genetic screening for cancer and other multifactorial diseases	Assignment 2 Submission 11:55 pm Assignment 3. Analysis of a published journal paper	Test on 25 May
4.	30 Apr	Medical and Pharmaceutical Biotechnology Drug Discovery & Development. Overview of the major steps to take a drug from the research laboratory through to the market place. Target validation and drug development – genomics and proteomics, rational drug design.		
5.	7 May	Industrial and Environmental Applications Can biotechnology provide solutions to the world's reliance on non-renewable energies? Can biotechnology lead to cleaner, greener technologies? Industrial enzymes and biocatalysts, green plastics, environmental biotechnology		
6.	14 May	Biological Weapons, Bioterrorism, and Biosecurity The threat of biological weapons and how they may be counteracted. Emerging biological threats – Bird flu, SARS, Ebola etc. Does biotechnology have solutions to such threats?		
7.	21 May	Social and Ethical Issues of Biotechnology Modern biotechnology has the potential to be of great benefit to humanity. But there are also serious ethical, moral, and social issues raised by the application of biotechnology. "Playing God" Discussion of the moral, social and ethical issues created by modern biotechnology.	Assignment 3 assessment test: 25 May 3:00 – 5:00 pm	
8.	28 May	Study Week		
9.	4 Jun	Examinations		
10	11 Jun	Examinations		