



# Curtin University

## Unit Outline: Molecular Techniques 632. Semester 1. 2012

<b>Unit Index No:</b>	6753
<b>Credit points:</b>	25
<b>Prerequisite Units:</b>	Molecular Genetics 631
<b>Online Teaching Unit Category</b>	Essential. Unit materials and resources are available from the unit's Blackboard site. The online unit site is designed to be a significant component of the unit. It is a requirement for students to have full internet and web access.
<b>Requirements:</b>	Competence with computer software (such as word), ability to source scientific information and familiarity with basic bioinformatics tools. Ownership of, or access to, appropriately configured computer with internet and web access (either on or off campus).
<b>Tuition Pattern</b>	2 hours lecture and 1 hour tutorial (usually all on Friday)
<b>Study Load</b>	About 11 to 13 hours per week including lectures and tutorials (depends also on prior knowledge and ability)
<b>Unit Coordinator</b>	Dr Steven Bottomley Room 308:204 School of Biomedical Sciences Curtin University of Technology email: s.bottomley@curtin.edu.au phone: (08) 9266 4369 fax: (08) 9266 2342

**This document is important, so please read it carefully before commencing your study in this unit.**

**SCHOOL OF  
BIOMEDICAL SCIENCES**

## Welcome!

Welcome to Molecular Techniques 632!

The unit consists of 10 self-contained modules that highlight some of the recent key molecular techniques used in biomedical sciences. The unit is designed to help you learn through a combination of lectures, tutorials, assignments, and assessments. You may find the unit challenging but also rewarding.

We hope you enjoy learning some of the impressive current techniques used in biomedical sciences.

## Syllabus

This unit highlights some of the key techniques in modern biomedical sciences. Techniques covered include: DNA isolation, advanced polymerase chain reaction (PCR) methods, DNA cloning and sequencing, proteomics, protein expression, discovery and purification methods, cell culture techniques and antibody technology. The theory and applicability of these techniques are presented.

## Learning Outcomes

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

1. Remember and recall facts and details of modern molecular techniques.
2. Describe and explain aspects of molecular techniques
3. Apply learned knowledge to solve problems
4. Analyse and interpret biochemical data and information.
5. Evaluate molecular techniques.
6. Use appropriate software and data sources to synthesize and gather information.

## Learning Activities

The following table shows that this unit is divided into 10 self-contained modules. Each module consists of a two-hour lecture followed a week later by a one-hour tutorial session. This separation gives you a chance to absorb the information that was presented in the lecture, and allows you to bring any questions you might have to the tutorial, and more importantly, allows you to be a strong participant in the tutorial.

Module Topic	Description of topic	Lecturer
DNA sequencing strategies	Principles of DNA sequencing, including pyrosequencing and massively parallel sequencing.	A/Professor David Groth
Cloning Strategies	Types of cloning vectors and their appropriate use	Dr Keith Gregg
<i>In vitro</i> gene expression	Protein synthesis and <i>in vitro</i> methods for gene expression	A/Professor David Groth
Cell culture	Theory and applications	Professor Deirdre Coombe
Proteomics and the proteome	Introduction to 2D proteomics	Mr Robert Stueart
Protein purification methods	Review of modern protein purification methods	Dr Steven Bottomley
Amplification technology	PCR, current fragment analysis methods,	Dr Ross Graham
Antibody technology	Use of antibodies in molecular technology	Dr Brian Brestovac
Epigenetics	How modifications that don't affect the sequence of DNA can affect phenotype.	Dr Ross Graham
Single Nucleotide Polymorphisms	Detection and analysis of SNPs	Dr Ross Graham

## Learning Resources

Lecturers will give you information about their module topic.

## Textbooks

There is no recommended textbook for this unit, however, the following textbooks may assist with your study:

- Clark, D.P., (2005) *Molecular Biology Understanding the Genetic Revolution*
- Pierce, B.A., (2008) *Genetics: A Conceptual Approach*.
- Reece, R.J., (2004) *Analysis of Genes and Genomes*.
- Wilson, K., & Walker, J., (2000) *Principles and Techniques of Practical Biochemistry*. Cambridge University Press

## Lecturers

Lecturers will assist you with your learning and any problems or difficulties you may be experiencing while undertaking this unit. They will also provide appropriate feedback for you in class activities or tutorials. As each lecturer delivers his or her module to you, they will provide you with contact details.

Lecturers are always approachable and welcome your questions. Do not be afraid to ask the lecturer questions. However, please be aware that the demands on a lecturer's time are very great and the lecturer may not be able to respond immediately to your question. If the lecturer can't see you immediately, or you need to establish a definite time for a meeting, then you will be required to make an appointment. There may also be times during semester where the lecturer, for whatever reason, is unavailable for any student consultation. Please also note that the university has limited a lecturer's time for activities involved with various activities including the activities of consultation, assessment, and feedback (see later).

If for some reason, you feel you can't approach the lecturers in person then please don't hesitate to take advantage of the other ways of communicating with lecturers such as: telephone, during class (by asking questions), by the Blackboard bulletin board, email, or even by a note left in the lecturer's mail box!

## Delivery of Unit

3 hours per week allocated as follows:

- Lecture 1 x 2 hour
- Tutorial 1 x 1 hours

## Lectures & Tutorials

Attendance at all lectures and tutorials is strongly recommended. Why? Well, the lecturer may cover material in a slightly different way or have a particular emphasis on some concepts that will not always be obvious in the online lecture presentations or a textbook. The lecturer may also cover material required to answer online assessments or for the reading assignments. Lectures also give you a convenient opportunity to ask your lecturer questions, to meet with your fellow students, and discuss the subject with your colleagues. Most of the lecture presentations are available on the Blackboard site in Adobe Acrobat (pdf) format. Tutorials are also an important time for you to consolidate your knowledge, ask questions, and practice what you have learned.

Lectures are continually modified and updated. Consequently, some lectures may not yet be available on the Blackboard site. Where lecture notes are not provided it is still your responsibility to write your own lecture notes! In fact, even if lecture notes are provided it is still your responsibility to write your own lecture, and study, notes!

Not all questions in your assessments can be answered by simple regurgitation of lecture material. Lectures will be given at times shown in the unit schedule. However, the scheduled lecture or lecture content may be changed at any time at the discretion of the lecturer or unit coordinator. The subject of a lecture may be given earlier or later than that shown in the indicated schedule. Some lectures may also be extended or curtailed. These alterations may depend upon the perceived progress of the student cohort and other factors. However, you will be notified of any changes especially those that may affect assessments.

Finally, your understanding of each topic will only be achieved satisfactorily with broader reading of your text and other reference materials. Remember, it is your understanding of the topics that will be assessed in this unit not the lecturer's! You may also find that you need to study more (or less) than other students depending upon your existing knowledge and ability. **Please understand that ultimately you are responsible for your own learning!**

## Feedback

Feedback occurs when information is exchanged between you and your lecturers. You provide information to help the lecturers learn more about you, your knowledge, or correct any misunderstanding. Your lecturers provide you information to help you learn, correct any misunderstanding, or clarify what you need to do. Feedback can occur at any time during semester either in class or out of class. This unit encourages **feedback** in many different ways including:

- Lectures and tutorials
- Announcements on Blackboard
- Bulletin Board on Blackboard
- Personal email
- Personal appointment
- 'Questions for Learning' (see later)
- Formal assessments.

### ***Time allocated to Consultation, Assessment, and Feedback.***

This unit involves assessment (designed by lecturers and managed by the unit coordinator) and feedback through all of the ways mentioned above. All lecturers, and the unit coordinator, in this unit are also available for personal consultation. However, you should be aware that there are time constraints on these important activities of consultation, assessment, and feedback. This has arisen due to Curtin University recently implementing an Academic Workload Management System to manage and audit academic workloads. This system allocates time to various academic activities or duties. Currently only 1 hour per student has been allocated in this unit for the combination of consultation, assessment, and feedback activities.

## Study Load

You will need to spend **at least 8 to 10 hours a week** outside of scheduled classes studying in this unit to be successful. You may need more time if you don't have a strong background in biochemistry or molecular biology.

## Assessments

Assessment in Molecular Techniques 632 is designed with the following aims:

- help you learn the subject
- reward your performance for achieving the learning outcomes
- to give you various opportunities to demonstrate your learning and achievement of the learning outcomes.
- allow you to study continuously rather than 'cram' at the end of semester
- provide appropriate and timely feedback
- discriminate between those students who do the work and those who do not
- establish, maintain, and protect internationally recognised academic standards

A summary of the assessment descriptions and requirements are listed in the table below. **Please Note:** Details of the assessment may change at any time at the discretion of the unit coordinator. However, you will be notified of any changes.

Molecular Techniques 632 Assessment Summary			
Component	Description	Requirements	% Total Semester Mark
<b>One Mid Semester Online Assessment</b>	Satisfactory completion of unsupervised, 'open book', online questions on topics in the molecular techniques syllabus. You can answer as many questions as you like. Automatic assessment and feedback is given after completion of the questions.	Satisfactory completion means that you achieve at least 50% of the assessment mark.	1 x 30 = 30
<b>Written Assignment</b>	Satisfactory completion of a written assignment. Details of the assignment will be in a separate document.	Satisfactory completion means that you achieve at least 50% of the assessment mark according to the criteria.	1 x 30 = 30
<b>End of Semester Online Assessment</b>	Satisfactory completion of a supervised, 'closed book', end of semester online assessment that covers the entire syllabus for the semester.	Satisfactory completion means that you achieve at least 50% of the assessment mark.	1 x 30 = 30
<b>PeerWise Assignment</b>	Satisfactory completion of PeerWise assignment according to specific marking criteria. Further details of the PeerWise assignment is given in the unit outline and in separate documents.	Satisfactory completion means that you achieve at least 50% of the assessment mark. That is, at least 5% of your total semester mark for this assignment.	1 x 10 = 10
<b>Total Mark</b>			<b>100</b>

## **Important Notes about your assessments**

In accordance with Curtin policy, you are advised that this unit is a **significant unit** in which failure twice may lead to termination of your course. You are required to attempt **all** components of the assessment. Failure to attempt one, or more, components of the assessment, where there is no valid reason for the lack of an attempt, may result in a 'Failed-Incomplete' (F-IN) grade being allocated at the end of semester regardless of the total mark achieved.

### ***Extensions***

Extensions of time for taking any of the required assessments are usually not possible. If there are any extenuating circumstances (such as a medical emergency) then alternative arrangements may be made on a case-by-case basis. However, evidence must be provided such as a dated, and signed, medical certificate.

### ***Late Submissions***

Any unauthorized late submission will result in a decrease in marks of at least 10% of the assessment mark for each day overdue. For example, if an assessment is worth 20% of your total semester mark then the penalty for two days overdue would be:  $2 \times (10/100 \times 20\%) = 4\%$ . Thus, the total mark available for the assessment would be:  $20 - 4 = 16\%$ . This does not mean you would receive 16% because it would depend upon the quality of your submission according to the marking criteria.

### ***Supplementary Assessments***

If you fail the unit then you may be offered a supplementary assessment. Supplementary assessments are awarded only at the discretion of the Board of Examiners. They are not an automatic right and the Board of examiners will carefully review each individual case. The aim of a supplementary assessment is to allow the student a chance to correct minor problems or deficiencies in the initial assessment and not to gain extra study time or correct major problems. The number of supplementary assessments awarded for each student will be kept to a minimum for a study period and a particular course of study.

Supplementary assessments, if awarded, will be indicated on the official Curtin examination result statement posted to all students, and will also be listed on the School notice board about 24 hours after the Board of Examiners meeting. It is your responsibility to check your status. A student who does not take a scheduled supplementary assessment has no claim to a further assessment. If you are awarded a supplementary assessment it is imperative that you confirm the type, and schedule, of the assessment. Assessments may be in any appropriate format including: multiple choice questions, short answer, essay, or project. The unit coordinator will determine the type of assessment after consulting with lecturers and the Board of Examiners.

### ***Deferred Assessment***

Deferment of an assessment is not automatic. Students may be permitted by the relevant Board of Examiners to defer an assessment for circumstances outside of the student's control. However, a student's overall performance may be taken into account in granting permission to defer an assessment.

Applications for deferment on health grounds or as a result of extenuating circumstances must be submitted not later than seven (7) days after the end of the relevant assessment was due to be submitted during the semester. Detailed medical certificates should be attached to the application where appropriate.

## **Assessment Details**

### ***Mid Semester Online Assessments***

The mid semester online assessment will be a supervised exam. The assessment will comprise up to 100 questions. These questions will be mostly multiple choice but other types of questions such as short answer may be used. This assessment covers the first five topics of the syllabus up to and including week 6. The date and time of the assessment will be announced during semester but it is likely to be conducted in the Computer Lab (308:104) during week 8 of semester. You have one attempt at the assessment.

***Important points to note about the mid semester online assessment:***

- No collaboration, books, or notes are allowed during online assessment either in printed or electronic form unless otherwise stated.
- Only the online assessment web site is to be open during the assessment. No other computer programs or internet sites should be open during the online assessment. The only exception is the computer's own calculator or an application needed for the assessment and approved by the lecturer.
- Only simple, non-programmable, calculators are allowed during online assessment.
- Mobile phones should be turned off and not used for any reason during the assessment.

If a student is found to contravene any of these points then it may result in the student receiving zero marks for this assessment.

### ***End of Semester Online Assessment***

The end of semester online assessment will be a supervised exam. The assessment will comprise up to 100 questions. These questions will be mostly multiple choice but other types of questions such as short answer may be used. This assessment covers the last five topics in the syllabus from about week 8 to 13. However, prior knowledge of the other topics is also assumed and there may be a few questions on

topics from the earlier topics. The date and time of the assessment will be announced during semester but it is likely to be conducted in the Computer Lab (308:104) during week 8 of semester. You have one attempt at the assessment.

***Important points to note about the end of semester online assessment:***

- No collaboration, books, or notes are allowed during online assessment either in printed or electronic form unless otherwise stated.
- Only the online assessment web site is to be open during the assessment. No other computer programs or internet sites should be open during the online assessment. The only exception is the computer's own calculator or an application needed for the assessment and approved by the lecturer.
- Only simple, non-programmable, calculators are allowed during online assessment.
- Mobile phones should be turned off and not used for any reason during the assessment.

If a student is found to contravene any of these points then it may result in the student receiving zero marks for this assessment.

***PeerWise Assignment***

PeerWise is a specialized web-based system that is unique, and innovative, way to learn biomedical techniques and develop your thinking skills. It is said that you 'learn by teaching' and that is exactly what you will do with this assignment. You will research, design, and write your own multiple-choice questions (MCQ). You will use the web-based system to write your question, the distractors (incorrect answers), the correct answer and feedback. Your questions will then be subject to review by your peers. You will also review other student's questions using PeerWise.

You will write at least 4 MCQs according to the requirements and peer review 8 other questions written by other students. Points will be awarded based upon your contributions and the assessment of your questions by your peers. More details of the PeerWise assignment will be provided in a separate document on Blackboard.

***Written Assignment***

You must complete a written assignments worth 30% of the total semester mark. The assignment is a 'problem-based' teaching approach designed to help you:

- keep pace with the unit
- learn the subject material
- apply knowledge, facts, concepts, and principles
- develop your research skills
- explain, discuss, and communicate in writing
- practice analytical and problem solving skills
- find and assemble information
- assess and evaluate the biochemical literature

The assignment could include one or more of the following tasks: answering questions, research assignments, calculations, problem solving, case studies, allocated reading, journal reviews, or skill development. You may need to complete the assigned tasks by a particular date. The kinds of task(s) you will be required to complete, and the format required, will be posted to Blackboard within the first two weeks of the start of semester.

Citing appropriate references for your research is an important aspect of science communication and you need to visit the Curtin Library web site to learn more about how you should correctly use, and cite, references. **Please note** that only credible, and preferably peer-reviewed, sources will be accepted. A reference to general, and potentially unreliable, web sites such as 'Wikipedia' and 'Answers.com' are not usually acceptable.

Collaboration with other students is encouraged, but the submitted assignments must be **your own work**. Consequently, you must be careful to appropriately cite all references you use in your answers to the assignment questions. **Collusion or plagiarism will not be tolerated** – please see the policy statements below. Please note that electronic checks may be made on each submitted assignment using specialist software that detects significant similarities and known references.

## Mobile Phones

As a courtesy to both lecturers and other students, if you have a mobile phone, please ensure that it is turned off, or muted, during lecture and practical sessions. Mobile phones should also be turned off and not be used for any reason during supervised assessments. Students who do not comply with this request may be asked to leave the class.

## Plagiarism Policy

Collaboration with other students is encouraged, but the submitted assignments, and assessments, must be YOUR OWN WORK. Consequently, you must be careful to appropriately cite all references you use in your answers to the assignment questions. **Collusion or plagiarism will not be tolerated**. Please note that electronic checks may be made on any submitted written assignment using specialist software that detects significant similarities and known references.

It is not acceptable to simply copy the words of other students or authors when completing any assessment or assignment in this unit. This action constitutes plagiarism and is regarded as academic malpractice. The penalties for plagiarism can be severe and may include termination from your course of study. All direct quotes must be correctly attributed to the author and should be kept to a minimum. Also, you should include a list of references to acknowledge the source(s) of information used to produce any written work. You should also familiarize yourself with Curtin University's policy on academic (student) integrity and plagiarism at: <http://academicintegrity.curtin.edu.au/studentbook.html>.

## Student Rights and Responsibilities

You are responsible for your own learning. It is also important for you to read and understand the following statement<sup>1</sup>:

“It is the responsibility of every student to be aware of all relevant legislation and 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’ communication with students. Further information is available at: [www.students.curtin.edu.au/rights/](http://www.students.curtin.edu.au/rights/)”

Other University policies you should be familiar can be found at: <http://www.policies.curtin.edu.au/>

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<sup>1</sup> *Teaching and Learning at Curtin* (2009) page 16. Office of Teaching and Learning. Curtin University.

## Lecture & Tutorial Timetable

The tutorial for a given module will be held the week after the lecture, to give you time to study the topic. For example, the lecture for the Cloning Strategies module will be held during week 2, and the tutorial for that module will be held during week 3, just before the lecture on Epigenetics.

<b>Molecular Techniques 632 Proposed Lecture &amp; Tutorial Timetable 2012</b>			
<b>Week</b>	<b>Thurs Date</b>	<b>Tutorial Thursday 10-11am 307.102</b>	<b>Lecture Thursday 11am-1pm 307.102</b>
1	1-Mar	Introduction	Amplification Technology
2	8-Mar	Amplification Technology	Cloning Strategies
3	15- Mar	Cloning Strategies	Antibody Technology
4	22- Mar	Antibody Technology	Epigenetics
5	29- Mar	Epigenetics	In Vitro gene expression
6	5-Apr	In Vitro gene expression	Mid Term Study & Feedback
7	12- Apr	<b>Tuition-free week</b>	<b>Tuition-free week</b>
8	19- Apr	Mid Term Study & Feedback	DNA Sequencing Strategies
9	26- Apr	DNA Sequencing Strategies	Protein Purification Methods
10	3-May	Protein Purification Methods	Cell Culture
11	10- May	Cell Culture	Single Nucleotide Polymorphisms
12	17- May	Single Nucleotide Polymorphisms	Proteomics
13	24- May	Proteomics	End of Semester Discussion
14	31- May	End of Semester Exam Study Week	End of Semester Exam Study Week