

<b>Name:</b>	
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## Unit Outline

# Genetic Engineering 331

## Semester 1 2012

### Unit Details

Unit Index No	311426 v.2
Genetic Engineering 331:	
Credit Points	25
Unit Coordinators [Semester 1]	Associate Professor David Groth
Office	308:209A
Address	School of Biomedical Sciences, Curtin University GPO Box U1987, PERTH WA 6845
Email:	D.Groth@curtin.edu.au
Phone:	(08) 9266 7475
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**SCHOOL OF BIOMEDICAL SCIENCES**

## Curtin University of Technology

### Method of Assessment

To pass this unit you must complete the assessment tasks listed below. Fill in your mark for each component as you receive it to keep track of your progress.

Assessment Task	Applies to ....	Worth	My Mark
Mid semester theory exam	Lectures	20%	
Practical test one (dry)	Practicals: Module 1	10%	
Practical test two (dry)	Practicals : Modules 2 & 3	20%	
Final Theory exam	Practicals & Lectures	50%	
<b>TOTAL</b>		<b>100%</b>	

Detailed information on assessment in this unit can be found in the sections of this plan titled 'Assessment Format ' and 'Assessment Details'.

#### **YOUR ATTENTION IS DRAWN TO THE FOLLOWING**

All units, including this unit, for enrolled Curtin University of Technology students are subject to the following policies –

1. The University statement on the nature and unacceptability of academic dishonesty including cheating, plagiarism and the fabrication or falsification of data.
2. The University statement on individual rights and responsibilities regarding the proper use of copyright material.
3. Student Charter.

This Charter states the expectations of students and staff in their interactions as members of the Curtin community.

4. Grievance Procedures

This policy covers “Any real or perceived ground for complaint including perceived racial or sexual harassment; discrimination on the grounds of disability, race, religious belief, political viewpoint, sex, marital status or pregnancy; or any other unfair or improper treatment.”

**It is your responsibility to familiarise yourself with these policies**

**Semester structure for 2012.**

The semester structure for 2011 is 12 teaching weeks preceded by an orientation week. Students are required to attend scheduled events during the orientation week.

**Welcome**

Welcome to Genetic Engineering 331

This unit is a CORE third year unit in the course.

The aim of the unit is to introduce students to the techniques used in molecular biology and their applications in the study of living systems and their functioning at the molecular level. The importance of molecular biology in the biomedical sciences will be examined. In the practicals you will get "hands on" experience of the major techniques used in this area of Biotechnology. Molecular biology has grown out of the fields of biochemistry, microbiology, immunology, haematology, and histopathology, and requires an understanding of some aspects of all these disciplines.

David Groth  
Unit Coordinator

**Requirements to complete the unit**

**Prerequisite Skills**

The content covered in this unit assumes that you:

1. are competent in English, basic mathematics and basic chemistry
2. have reasonable written and verbal communication skills
3. can effectively source, access and use library resources (printed and electronic)
4. are familiar with the use of a computer.
5. have successfully completed the prerequisite units

**Laboratory Charge**

There is no laboratory charge for this unit

**Technology**

It is helpful, but not essential, that you have access to:

- a computer with an Internet connection, which you can use effectively
- email (preferred), a telephone or a fax machine to contact your tutor and other students studying the same unit.

You can access the computing facilities on campus if you do not have a computer at home.

## **Aims**

This unit aims to introduce you to the theory and application of basic techniques, which are used in many molecular investigations. The course is orientated toward nucleic acid based technologies.

## **Syllabus**

This unit consists of **five topics**, which cover techniques used in Molecular Genetics. The five topics are:

1. **Enzymes, cloning vectors and applications.**  
First of all, this topic introduces the basic reagents used in molecular biology. You will learn which enzymes are commonly used and their applications, the nature of cloning vectors, and techniques that are used to isolate different kinds of nucleic acids. At the end of this unit you will know the function of most of the enzymes commonly used in molecular biology and several of their applications.
2. **Southern blotting and applications.**  
Most molecular biology laboratories use the technique of Southern Blotting. You will learn about the various forms of this technique and the practical classes designed for this section will give you experience in performing a Southern blot and the associated DNA hybridisation. This process will be used to answer a simple question about the target DNA. You will also learn some of the diverse applications for this technique.
3. **Polymerase chain reaction (PCR) and its applications.**  
The technique called polymerase chain reaction has become widely used in medical biotechnology and biological science generally. In this section you will learn the mechanisms of the process and, through case studies, identify different applications. The practical class accompanying this section will explore different applications of the basic technique.
4. **Genetic libraries, construction, use and identification of DNA clones, including DNA sequencing.**  
From this section you will understand the ways in which genomic and cDNA libraries are constructed and the strategies used to identify specific gene regions.
5. **Use of radioactive substances.**  
A short section designed to teach you aspects of working safely with radioactive substances and ultraviolet radiation.

## **Unit Outcomes**

**At the completion of this unit it is expected that you will be able to:**

1. Conduct and evaluate data from genetic technologies used to analyse variation in DNA.
2. Discuss the cultural and ethical implications of the use of gene technologies.
3. Analyse and synthesize protocols for the cloning of DNA and RNA to construct new recombinant molecules.
4. Use laboratory tasks to interpret and draw conclusions in molecular techniques.
5. Work in a small team to collect data for laboratory experiments.

## **Unit Materials**

### **Unit Outline**

This unit outline gives you important information about the general aims of the unit, texts and references, and details about the assessment, including allocation of marks, grading criteria and submission dates. You should make this unit outline the first document that you read for the unit. Study it carefully, paying particular attention to assessment instructions and submission dates.

### **Textbooks and References**

One of the following texts is essential for this unit:

“From Genes to Genomes ; Concepts and applications of DNA technology”, Dale, JW and von Schantz M, Wiley (2007) Print ISBN:9780470017333

or

“Analysis of Genes and Genomes” Richard J Reece, Wiley (2004) ISBN : 0-470-84380-2

As an optional text, you might like to consider purchasing the following text. It should prove to be a useful reference book throughout your course:

Principals of gene manipulation, 7th ed or later version, Old and Primrose, Blackwell Scientific

These books are available from the Curtin University Bookshop.

### **Web-Based Resources**

You will be referred to a wide range of resources, including course notes and information, on the World Wide Web. This information can be accessed using a tool known as Blackboard. All students in the unit will need regular access to this site. You will use such features as chat rooms, bulletin boards, email and quizzes to complete various components of the unit. Additional unit materials are also available from this site.

## **Contact Details**

The unit coordinator for this unit is Associate Professor David Groth, in the School of Biomedical Sciences at Curtin, who will deliver most of the lectures.

During the semester you may need to contact me, there are a number of ways to do this. Contact by e-mail is preferred, but personal contact, phone or fax are also suitable alternatives.

<b>office</b>	308.209A
<b>e-mail</b>	D.Groth@curtin.edu.au
<b>phone</b>	(08) 92667475/ mobile 0417915837
<b>fax</b>	(08) 9266 2342

## **Study Load**

You will need to spend about **6-8 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 basic arithmetic and chemistry and/or if you have not studied in the field of biological sciences before. Those of you who are not fast readers may also need to spend more time on the unit. Keeping up with the work is the key to being successful in this unit.

## **Delivery of Unit**

### **Tuition Pattern**

8 hours per week allocated as follows:

- Lectures 2 x 1 hour
- Practical prelab/postlab/tutorials 1 x 1 hour
- Practical 1 x 5 hours plus 2 hours preparation

**Lectures**

Attendance at all lectures is very strongly recommended. Some information delivered in the lectures will not be available from the lecture notes. In previous years there has been a good correlation between attendance and final mark. Under special circumstance and with the agreement of the course coordinator, you can opt to complete the lecture component of the unit by external study. Students wishing to follow this option should contact David Groth.

**Tutorials**

The prelab/postlab session are designed to familiarize you with the practical procedures and calculations. There are several tutorial style sessions aimed to develop integrated thinking, which will take the form of case studies.

**Practicals**

Attendance at practical sessions is required. The correct clothing must be worn to all laboratory sessions and the appropriate safety regulations and behaviour must be observed at all times. A recording of attendance may be taken.

**IMPORTANT NOTE**

During this semester you will be working with specimens from hospital patients and reagents prepared from blood, blood products or body fluids. These materials may be capable of transmitting disease, including hepatitis and AIDS. For this reason, all specimens and reagents must be handled as if they were infectious. As a precaution against biological hazards, you may be required to undertake vaccination for Hepatitis B and undergo Tuberculin testing during this semester.

## Assessment Format

This unit is assessed as follows:

Semester assessment			Outcome assessed
	Mid semester test	20%	1,2,3
	Practical Test 1	10%	4,5
	Practical Test 2/3	20%	4,5
	Practicals sessions (wet)	Not assessed	
Final Examinations	Combined theory (whole semester) and practical	50%	1,2,3,4
<b>TOTAL</b>		<b>100%</b>	

In accordance with Curtin policy, students are advised that this unit is a **SIGNIFICANT UNIT** in which failure twice may lead to termination of a student's course. **Students should note that a mark of 50% or more in BOTH the theoretical and practical component of the unit is required in order to secure a pass, and that failure in any one area may result in an overall failure in this unit regardless of the total marks accrued. That is, a pass in the practical component but failure in the theory component (or vice versa) may lead to a fail grade for the unit, even though the student's total mark may exceed 50%.**

## Assessment Details

### Practical Component

The practical is divided into three modules. Each module is based upon a theme. Two practical assessments will be performed throughout the semester. Each test covers the questions in each module (ie test one covers material in the practical of module 1 and test 2 covers the material in modules 2 and 3) and other relevant questions relating to the material covered in the module. These will cover aspects of the laboratory work performed within the semester and will include theoretical aspects where appropriate. Completion of the questions in the practical workbook will assist in answering some of the q's in these assessments. These assessments are open book with respect to the practical workbook and calculators are recommended. **Non-attendance of a practical test without a valid medical certificate will result in no marks being allocated to that section and may result in eventual failure for the unit.**

### Theory Assessments

These will require you to sit a one hour mid-semester theory assessment under supervision. You will be provided with a formula sheet and permitted to use a calculator but cannot refer to your module notes or workbook during the assessments. The scheduling of this assessment is

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shown in the study timetable. NOTE: All material that is presented in lectures is examinable, not just the material provided in lecture notes.

### **Final examinations**

The final theory examination will consist of a supervised, 2 hour paper to be conducted during the official university examination period. This will be a closed book exam. No notes or books will be allowed into the examination room. The use of a calculator that does not allow text or data storage is permitted. **Electronic devices that can store text or data are not permitted.** Further details regarding the final examinations will be provided later in the semester.

### **Plagiarism Policy**

Academic honesty is crucial to a student's credibility and self-esteem, and ultimately reflects the values and morals of the University as a whole. A student may work together with one or a group of students discussing assignment content, identifying relevant references, and debating issues relevant to the subject. Academic investigation is not limited to the views and opinions of one individual, but is built by forming opinion based on past and present work in the field. It is legitimate and appropriate to cite the work of others, provided that such work is clearly and accurately referenced.

It is not acceptable to simply copy the words of other students or authors when completing the weekly exercises and assignments 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.

The School of Biomedical Sciences advises students that it will use screening software to check for plagiarism in submitted work suspected of containing plagiarised material and also for routine screening of text as deemed appropriate by the Head of School.

University policy on academic integrity, including plagiarism can be found at: <http://www.policies.curtin.edu.au>. A website has been developed to support both staff and students in matters related to academic or educational integrity. The URL is <http://academicintegrity.curtin.edu.au>.

## 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. The number of supplementary examinations awarded will be kept to a minimum for any one examination period and for this course of study.

NB. **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, and will also be listed on the School notice board 24 hours after the Board of Examiners meeting. It is **your** responsibility to check your status. A student who does not sit for a scheduled supplementary examination has no claim to a further examination. If you are awarded a supplementary examination it is imperative that you confirm the time and venue for the exam.

## Deferred Assessment

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

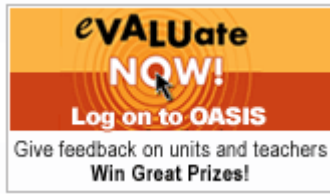
Applications for deferment on health grounds or as a result of extenuating circumstances must be submitted not later than seven (7) days after the end of the relevant examination period or assessment date during the semester. **Detailed** medical certificates should be attached to the application where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

The prescribed application form may be obtained either from Admission and Student Records, the Course Administrator or the First Year. Completed forms **must** be submitted to the Course Administrator. This includes applications for deferred assessment for units in your course of study conducted by **other** Schools.

## Mobile Phones

As a courtesy to lecturers and other students, if you have a mobile phone, please ensure that it is TURNED OFF during lecture, tutorial and practical sessions. Students who do not comply with this request can be asked to leave the class.

**Student feedback**



For Semester 1 **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 constructive 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>).

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**Study Timetable 2012**  
**Genetic Engineering 331**

	<b>Week beginning date</b>	<b>LECTURE TOPIC 4-5pm Monday Room 307.101</b>	<b>LECTURE TOPIC 3-4 pm Friday Room 307.101</b>	<b>PRELAB/ POSTLAB 4-5pm Friday Room 307.101</b>	<b>PRACTICAL 310.103B</b>
<b>1</b>	27 <sup>th</sup> Feb	Enzymes I (DG)	Enzymes II (DG)	Prelab Module 1 (DG)	NO PRACTICAL
<b>2</b>	5 <sup>th</sup> March	Enzymes III (DG)	PCR I (DG)	To Be Announced	1 <sup>st</sup> : Solution Prep 2 <sup>nd</sup> : DNA extraction
<b>3</b>	12 <sup>th</sup> March	Methods of DNA isolation (KM)	Bacteriophage Vectors (DG)	Tutorial 1 (DG)	1 <sup>st</sup> : DNA purification 2 <sup>nd</sup> : DNA quantitation : spectral analysis
<b>4</b>	19 <sup>th</sup> March	DNA Sequencing (DG)	Plasmid Based vectors (DG)	Post-Lab Module 1 Pre-Lab Module 2 (DG)	1 <sup>st</sup> : DNA cloning 2 <sup>nd</sup> : Plasmid isolation
<b>5</b>	26 <sup>th</sup> March	Southern Blotting (DG)	Labelling DNA/ Oligonucleotides (DG)	Tutorial 2 (DG)	1 <sup>st</sup> : RE mapping 2 <sup>nd</sup> : Southern Blotting
<b>6</b>	2 <sup>nd</sup> April	Radiation Issues (KG)	<b>Good Friday</b>	<b>Good Friday</b>	NO PRACTICAL
<b>7</b>	9 <sup>th</sup> April	<b>WEEK FREE</b>	<b>WEEK FREE</b>	<b>WEEK FREE</b>	<b>NO PRACTICAL</b>
<b>8</b>	16 <sup>th</sup> April	DNA Hybridisations (DG)	Genomic Libraries (DG)	<b>Module 1 test (DG)</b>	1 <sup>st</sup> : Review session
<b>9</b>	23 <sup>rd</sup> April	RNA Isolation (DG)	cDNA Libraries I (DG)	Post-Lab Module 2 Pre-lab Module3 (DG)	1 <sup>st</sup> : DNA Hybrid. 2 <sup>nd</sup> : Autoradiography
<b>10</b>	30 <sup>th</sup> April	<b>Mid Semester Exam (DG)</b>	Mutation/Detection (DG)	Tutorial 3	1 <sup>st</sup> : PCR 2 <sup>nd</sup> : TBA
<b>11</b>	7 <sup>th</sup> May	Screening Libraries (DG)	PCR II/Real Time PCR (DG)	Tutorial 4	1 <sup>st</sup> : PCR 2 <sup>nd</sup> : TBA
<b>12</b>	14 <sup>th</sup> May	Site Directed Mutagenesis (DG)	Detection of epigenetic changes (DG)	Post-Lab Module 3 (DG)	1 <sup>st</sup> : PCR 2 <sup>nd</sup> : TBA
<b>13</b>	21 <sup>st</sup> May	In-vitro gene expression, production of GM proteins (KG)	Review (DG)	<b>Module 2/3 Test (DG)</b>	1 <sup>st</sup> : Finish PCR 2 <sup>nd</sup> : Revision session
<b>14</b>	28 <sup>th</sup> May	<b>Study Week</b>			
<b>15</b>	4 <sup>th</sup> June	<b>Exam Week</b>			
<b>16</b>	11 <sup>th</sup> June	<b>Exam Week</b>			

Lecturers: KG: Keith Gregg; DG: David Groth; KM: Kylie Munyard