



Faculty of Engineering
Graduate School of Biomedical Engineering

Term 2, 2019 **BIOM9420 Clinical Laboratory Science**

COURSE DETAILS

Units of Credit 6
Contact hours Monday 9-12 am
Lecture CLB8
Tutorial/Laboratory Mathews 101
Mathews 102
Mathews 104
Mathews 105
Mathews 227

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Demonstrators Lucy Fu
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Habib Joukhdar

INFORMATION ABOUT THE COURSE

This course outlines the fundamental science that underlies clinical laboratory tests. Students are will explore how Biomedical Engineers have used these fundamentals to develop diagnostic equipment for the laboratory and clinical environment.

There is no assumed knowledge for this course. This course compliments other BIOM courses and certain thesis topics.

HANDBOOK DESCRIPTION

This course outlines the technologies, tests and operation of a variety of clinical laboratory testing systems (biochemistry, haematology and immunology) and how they apply to a particular organ or system. The students will also be exposed to the underlying principles involved in the measurement of certain physiological parameters from some of the complex organ systems including the urinary, pulmonary, cardiac and musculoskeletal systems. An important component of the course is two practical sessions. The first focuses on the fundamentals of enzyme biochemistry and how this might be useful in generating a test for a particular disease and the second will build upon this knowledge to design, fabricate and test a diagnostic test strip for glucose.

OBJECTIVES

The objectives of this course align with program outcome attributes and assessment tasks as follows:

Course objectives	Assessment task	Program outcome attributes
Identify the underlying principles of a variety of clinical testing systems	Quizzes Enzyme Activity Assessment Clinical Trial Report Final Exam	An in-depth engagement with the relevant disciplinary knowledge in its inter-disciplinary context. Capacity for analytical and critical thinking and for creative problem solving. Ability to engage independent and reflective learning. Information literacy. Skills for effective communication.
Apply problem-solving skills to a variety of case studies from the medical field.	Tutorial questions, Quizzes Clinical Trial Report Final Exam	Capacity for analytical and critical thinking and for creative problem solving. Skills for effective communication.
Demonstrate teamwork skills and reflect on individual strengths through collaborating with others in a team environment.	Lab report Clinical Trial Report Team evaluation	Skills for collaborative and multi-disciplinary work.
Produce a scientific report on a clinical laboratory device	Clinical Trial Report	Skills for effective communication.

TEACHING STRATEGIES

A combination of lectures, tutorials, laboratory classes and online modules are used in this course to expose students to a range of teaching modes. These modes encompass a range of teaching styles, including passive and active participation.

Private Study	<ul style="list-style-type: none">• Review lecture material• Work through online modules• Work through activities and do set assignments• Reflect on class problems and assignments• Download and work through materials from Moodle• Keep up with notices and find out marks via Moodle
Lectures	<ul style="list-style-type: none">• Find out what you must learn• Follow worked examples• Hear announcements on course changes
Activities (problem solving sessions, laboratory work)	<ul style="list-style-type: none">• Hands-on work, to set studies in context• Be guided by experts• Practice solving set problems• Ask questions
Assessments (quizzes, final examination, major assignment and laboratory report)	<ul style="list-style-type: none">• Demonstrate your knowledge and skills• Demonstrate higher understanding and problem solving

EXPECTED LEARNING OUTCOMES

On completion of this course, the student should:

- Identify the underlying principles of a variety of clinical testing systems
- Apply problem-solving skills to a variety of case studies from the medical field.
- Demonstrate teamwork skills and reflect on individual strengths through collaborating with others in a team environment.
- Produce a scientific report on a clinical laboratory device

These learning outcomes will be achieved through maximal participation in area of the structured teaching strategies provided in class time (lectures and activities) as well as student-centred and self-directed learning (private study and completion of assessment tasks)

ASSESSMENT

The assessment tasks for BIOM9420 Clinical Laboratory Science have been designed to measure your achievement of the learning outcomes.

The final grade for this course will normally be based on the sum of the scores from each of the assessment tasks. The **Final Examination is worth 60%** of the final mark. A mark of at least 40% in the final examination is required before the class work is included in the final mark. The formal exam scripts will not be returned. Students who perform poorly in the quizzes and tutorials are recommended to discuss progress with the Course Convenor during the semester. The Final Exam will be a closed book exam with a combination of multiple choice and short answer questions. The final exam will be held during the formal exam period. Materials allowed: University approved calculator. Note: The Course Convenor reserves the right to adjust the final scores by scaling if agreed by the Head of School.

Two Quizzes worth 10% each are designed to encourage learning throughout the semester and prepare students for the types of questions in the final exam. These quizzes are available on Moodle.

Enzyme Activity Assessment worth 5% is an individual task to teach students on how to graph and analyse experimental data.

Clinical Trial Report worth 15% is a group report designed to consolidate learning in the practical activity as well as independent literature search.

The marks assigned and dates of submission of each assessment task are set out below. Details of each assessment component, the marks assigned to it, the criteria by which marks will be assigned, and the dates of submission are provided in detail on Moodle.

ASSIGNMENTS

Assessment	Due	Worth
Enzyme Activity Risk Assessment Quiz	17 Jun	5%
Enzyme Activity Assessment (With satisfactory on enzyme activity risk assessment quiz)	1 Jul	
Clinical Trial Protocol	24 Jun	15%
Clinical Trial Risk Assessment Quiz	1 Jul	
Clinical Trial Report (With satisfactory on clinical trial protocol and risk assessment quiz)	29 Jul	
Quiz 1	8 Jul	10%
Quiz 2	5 Aug	10%
Final Exam	TBC	60%

Assignments must be submitted via moodle by the designated date and time. The Clinical Trial Report must contain a [Non Plagiarism Declaration Cover Sheet](#)

Late submissions will be penalised 10% of the mark for each calendar day late, or part thereof. If you foresee a problem in meeting the nominated submission date please contact the Course Convenor to make an appointment to discuss your situation as soon as possible.

Assessment marks will be available on Moodle as soon as they have been marked, which will usually be within 2 weeks of submission.

COURSE PROGRAM

A table of lecture and activity class topics for each week, indicating the location and name of lecturer involved.

SEMESTER 2, 2019

Week	Date	Lecture	Online Module	Tutorial	Assessment Due
1	3 Jun	Diagnostic Engineering Part 1 <ul style="list-style-type: none"> Course introduction 	<ul style="list-style-type: none"> Diagnostic Engineering Cell cycle 	Clinical Trial Workshop I <ul style="list-style-type: none"> Diagnostic Engineering Cell cycle 	
2	10 Jun	Queen's birthday			
3	17 Jun	Diagnostic Engineering Part 2 <ul style="list-style-type: none"> Clinical Biochemistry module 	<ul style="list-style-type: none"> Clinical biochemistry 	Enzyme Kinetics Activity (Marble)	Enzyme Activity Risk Assessment Quiz
4	24 Jun	Diagnostic Engineering Part 3 (Blood Diagnostics)	Q & A for Wk1 and 3 online module	<ul style="list-style-type: none"> Clinical trial workshop II 	Clinical Trial Protocol due
5	1 July	Genetic testing	<ul style="list-style-type: none"> PCR Virtual lab Genetic testing Chromosomal Disorders Single gene inheritance 	<ul style="list-style-type: none"> Clinical trial III (actual lab) 	<ul style="list-style-type: none"> Clinical Trial Risk Assessment Quiz Enzyme Kinetics Activity report due
6	8 Jul	Imaging diagnostics		<ul style="list-style-type: none"> Genetics activity Review genetic testing online module Imaging tutorial questions 	Quiz1
7	15 Jul	Antibody diagnostics and biosensors		Antibody testing strips design	
8	22 Jul	Kidney function diagnostics	<ul style="list-style-type: none"> Glomerular filtration Urinary system 	Revision and problem solving	
9	29 Jul	Lung function diagnostics	<ul style="list-style-type: none"> 3D lung model YouTube links 	Revision and problem solving	Clinical trial report due
10	5 Aug	Cardiovascular function	<ul style="list-style-type: none"> Worked example – cardiac output Worked example – dilution Worked example - ECG 	Cardiac monitoring tutorial questions	Quiz 2
11	12 Aug	Gait function analysis (No F2F lecture)	Clinical gait analysis	Gait function analysis problem solving	

RELEVANT RESOURCES

- Introduction to Biomedical Engineering (3rd edition) by John Enderle and Joseph Bronzino
- Additional materials provided on Moodle.

COURSE EVALUATION AND DEVELOPMENT

Student feedback has helped to shape and develop this course, including feedback obtained from on-line evaluations as part of UNSW's myExperience process. Changes to the course have included revision to the course content and incorporation of additional practical activities. Last year students in the class provided feedback including '*Very interesting course and well organised.*', '*The activities were engaging, enjoyable, required critical thinking and were well integrated into the course.*'

DATES TO NOTE

Refer to MyUNSW for Important Dates, available at:

<https://my.unsw.edu.au/student/resources/KeyDates.html>

PLAGIARISM

Beware! An assignment that includes plagiarised material will receive a 0% Fail, and students who plagiarise may fail the course. Students who plagiarise will have their names entered on a plagiarism register and will be liable to disciplinary action, including exclusion from enrolment.

It is expected that all students must at all times submit their own work for assessment. Submitting the work or ideas of someone else without clearly acknowledging the source of borrowed material or ideas is plagiarism.

Assessments **must** have a [Non Plagiarism Declaration Cover Sheet](#). This is for both individual and group work.

Plagiarism is the use of another person's work or ideas as if they were your own. When it is necessary or desirable to use other people's material you should adequately acknowledge whose words or ideas they are and where you found them (giving the complete reference details, including page number(s)). The Learning Centre provides further information on what constitutes Plagiarism at:

<https://student.unsw.edu.au/plagiarism>

ACADEMIC ADVICE

For information about:

- Notes on assessments and plagiarism,
- Special Considerations,
- School Student Ethics Officer, and
- BESS

refer to the School website available at

<http://www.engineering.unsw.edu.au/biomedical-engineering/>