

Subject Description Form

Subject Code	ABCT3113
Subject Title	Biochemical Techniques
Credit Value	4
Level	3
Pre-requisite	Biochemistry
Objectives	Through lectures, tutorials and practicals, this subject is intended to provide students with an understanding of the fundamental principles of instruments and techniques commonly used in biochemistry and molecular biology.
Intended Learning Outcomes	<p>Upon completion of the subject, students will be able to:</p> <ol style="list-style-type: none"> a. Apply the basic principles of various techniques on purifying and analyzing biomolecules and be able to design/criticize purification protocol. b. Demonstrate competent technical skills, analyze and critique experimental data. c. Apply various biological techniques including fluorescence, luminescence, real-time PCR, gel electrophoresis, design experiments and solve problems in modern day biological research projects.
Subject Synopsis/ Indicative Syllabus	<p>INDICATIVE CONTENT</p> <ul style="list-style-type: none"> • Principles & practices of chromatography – permeation, ion-exchange, affinity chromatography; gas chromatography; HPLC; separation of biomolecules 6 hours • Electrophoresis: principles and general techniques; special techniques-high voltage discontinuous, SDS-polyacrylamide, gradient, isoelectric focusing, two-dimensional electrophoresis and western blotting 6 hours • Fluorescence principle and its applications; flow cytometry 8 hours • DNA microarray 2 hours • DNA sequencing and fingerprinting 2 hours • Luminescence and chemiluminescence; luciferase, green fluorescent protein 2 hours • Real-time PCR 2 hours • Sample preparation: cell disruption, buffer, dialysis, concentration methods, measurement of proteins and nucleic acids 2 hours • Centrifugation and subcellular fractionation 2 hours

Teaching/Learning Methodology	<p>Lectures will be used to introduce the basic principles. Emphasis is put on the application of these techniques, rather than memorizing the detailed principles. Exercises and case studies in tutorials are used to teach students how to analyze experimental data and design experiments to solve some basic biochemical problem. Practicals will be used to allow students to have a hands-on experience in purifying and analyzing proteins. Lab reports are used to teach proper write up and communication skills.</p>																																																					
Assessment Methods in Alignment with Intended Learning Outcomes	<table border="1"> <thead> <tr> <th rowspan="2">Specific assessment methods/tasks</th> <th rowspan="2">% weighting</th> <th colspan="5">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th> </tr> <tr> <th>a</th> <th>b</th> <th>c</th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>1. Continuous assessment</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Lab reports</td> <td>10%</td> <td>✓</td> <td>✓</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>Oral presentation</td> <td>10%</td> <td>✓</td> <td>✓</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>Quiz</td> <td>30%</td> <td>✓</td> <td>✓</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>2. Exam</td> <td>50%</td> <td>✓</td> <td>✓</td> <td>✓</td> <td></td> <td></td> </tr> </tbody> </table> <p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</p> <p>Continuous assessment will include laboratory reports, exercises and case studies in tutorials and oral presentations. We will test the ability of students to understand the principles behind different biochemical techniques and assess their technical skills. Laboratory reports have to include the explanation of the principles of the techniques used. But more importantly, we require students to present the experimental results in a clear and organized manner and be able to interpret the results.</p> <p>The exercises and case studies in tutorials and preparatory reports will require students to understand the principles and applying these principles to analyse experimental results. There will be one quiz to test the students' understanding of basic principles. Experimental results will be presented in the quiz and students are expected to interpret the experimental data and be able to propose experiments to solve some basic biochemical problems.</p> <p>Examinations will be of the style of analysing experimental results and proposing new experiments based on the preliminary results provided in the questions. There is no need for memorizing difficult principles as such part will be a relatively small part of the examination.</p> <p>Students are required to attend at least 75% of scheduled sessions for the subject. Students fail to fulfill the attendance requirement will not be eligible to register ABCT4108.</p>							Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					a	b	c			1. Continuous assessment							Lab reports	10%	✓	✓	✓			Oral presentation	10%	✓	✓	✓			Quiz	30%	✓	✓	✓			2. Exam	50%	✓	✓	✓		
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Student Study Effort Expected	<p>Class contact:</p> <ul style="list-style-type: none"> ▪ Lecture ▪ Tutorials ▪ Practicals 						<p>32 Hrs.</p> <p>10 Hrs.</p> <p>24 Hrs.</p>																																															

	Other student study effort:	
	▪ Report writing and data analysis	24 Hrs.
	▪ Self-study (4 Hrs per week * 14 weeks)	56 Hrs.
	Total student study effort	146 Hrs.
Reading List and References	<p>1. Rodney Boyer “Biochemistry Laboratory: Modern Theory and Techniques”, 2nd edition, Pearson 2010</p> <p>2. Keith Wilson & John Walker “Principles and Techniques of Biochemistry and Molecular Biology”, 7th edition, Cambridge University Press 2010</p> <p>3. Current Protocols By Wiley InterScience (Online version available from Library)</p> <p>4. M.A. Vijayalakshmi “Biochromatography: theory and practice” London; New York: Taylor & Francis 2002 [electronic resource]</p> <p>5. Mahin Basha “Analytical Techniques in Biochemistry”, Humana Press 2020</p>	