



UNIVERSITI TEKNOLOGI MARA

BIO552: Analytical Biochemistry

Course Name (English)	Analytical Biochemistry APPROVED
Course Code	BIO552
MQF Credit	2
Course Description	This course focuses on techniques for the preparation, qualitative analysis, quantitative analysis of proteins and other biomolecules. The analytical techniques covered in this course include chromatography, electrophoresis, spectroscopy and mass spectrometry. Current issues related to application of these techniques in modern bio science research will be addressed. The outcomes of this course will be assessed through a variety of tools including the traditional final examination, tests, quizzes, assignments and lab reports. This course is essential for students intending a career as a laboratory technologist or research scientist in the areas of biochemistry, biotechnology and molecular biology.
Transferable Skills	1. Knowledge 2. Technical skill
Teaching Methodologies	Lectures, Lab Work
CLO	CLO1 Display various bioanalytical techniques in analyzing samples [P4]. CLO2 Solve scientific problems in analytical biochemistry [C3].
Pre-Requisite Courses	No course recommendations
Topics	
1. 1.Introduction: 1.1) a)SI base unit 1.2) b)mole concept 1.3) c)mass relationship 1.4) d)electron configuration 1.5) e)periodic tables 1.6) f)chemical bonds	
2. 2.Sample preparation, preservation and centrifugation: 2.1) a) protein extraction 2.2) b) plant metabolite extraction	
3. 3. Gas chromatography - mass spectrometry: 3.1) a) overview of instruments and components 3.2) b) steps to perform gas chromatography separation 3.3) c) application: metabolite identification	
4. 4. High performance liquid chromatography: 4.1) a)overview of instruments and components 4.2) b) steps to perform liquid chromatography separation 4.3) c) application: metabolite identification	
5. 5. Size exclusion chromatography: 5.1) a)overview of instruments and components 5.2) b) steps to perform size exclusion separation 5.3) c) application: protein purification	
6. 6. Spectrophotometry: 6.1) a) overview of instruments and components 6.2) b) steps to perform absorbance measurement 6.3) c) application: nucleic acid and protein determination	

<p>7. 7. One dimensional protein electrophoresis: 7.1) a) overview of instruments and components 7.2) b) steps to perform electrophoretic separation 7.3) c) application: whole-cell protein profiling</p>
<p>8. 8. Two dimensional protein electrophoresis: 8.1) a) overview of instruments and components 8.2) b) steps to perform isoelectric focusing and second separation 8.3) c) application: whole-cell protein profiling</p>
<p>9. 9. Western blot: 9.1) a) overview of instruments and components 9.2) b) steps to perform blotting method 9.3) c) application: protein identification</p>
<p>10. 10. Tandem mass spectrometry: 10.1) a) overview of instruments and components 10.2) b) steps to performs mass analysis 10.3) c) application: protein identification</p>
<p>11. 11. Bioinformatics: protein sequence similarity search: 11.1) a) overview of search tools 11.2) b) steps to perform sequence similarity search 11.3) c) application: identification of homologous proteins</p>
<p>12. 12. Bioinformatics: multiple sequence alignment: 12.1) a) overview of alignment tools 12.2) b) steps to perform multiple sequence alignment 12.3) c) application: identification of conserved regions</p>
<p>13. 13. Bioinformatics: protein domain analysis: 13.1) a) overview of public protein domain databases 13.2) b) steps to analyze protein domains 13.3) c) application: computational protein characterization</p>
<p>14. 14. X-ray crystallography: 14.1) a) overview of instruments and components 14.2) b) steps to perform crystallization, diffraction and Fourier transform analysis 14.3) c) application: protein structure determination</p>

Assessment Breakdown	%
Continuous Assessment	60.00%
Final Assessment	40.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Assignment	n/a	15%	CLO2
	Lab Exercise	n/a	30%	CLO1
	Test	n/a	15%	CLO2

Reading List	Recommended Text	<ul style="list-style-type: none"> Victor A. Gault and Neville H. McClenaghan 2013, <i>Understanding Bioanalytical Chemistry: Principles and Applications</i>, Wiley USA [ISBN: 978-0-470-029]
	Reference Book Resources	<ul style="list-style-type: none"> Jessica Carol 2016, <i>Text book of Analytical Biochemistry</i>, Syrawood Publishing House New York, NY 10017, USA [ISBN: 978-168286129] Andreas Manz 2015, <i>Bioanalytical Chemistry</i>, 2nd Ed., Imperial College Press London, United Kingdom [ISBN: 978-17832667]
Article/Paper List	This Course does not have any article/paper resources	
Other References	This Course does not have any other resources	