

# The Hong Kong Polytechnic University

## Subject Description Form

<b>Subject Code</b>	ABCT611
<b>Subject Title</b>	Analytical Biochemistry
<b>Credit Value</b>	Three
<b>Level</b>	6
<b>Pre-requisite</b>	Basic undergraduate training in biochemistry or equivalent.
<b>Objectives</b>	To explain and discuss principles of analytical biochemistry in the areas of protein purification, protein identification of proteomic technologies using various kinds of mass spectrometry and tags, chemical modification, affinity reagents, DNA microarray, biosensor (surface plasmon resonance) and real time polymerase chain reaction.
<b>Intended Learning Outcomes</b>	<p>Upon completion of the subject, students will be able to:</p> <ol style="list-style-type: none"> <li>Understand the principles behind the techniques used in analytical biochemistry</li> <li>Analyze/critique experimental results and to design experiments based on techniques learned from (a)</li> </ol>
<b>Subject Synopsis/ Indicative Syllabus</b>	<ul style="list-style-type: none"> <li>▪ Various kinds of approach in non-recombinant protein purifications (6.5 hours) Physical approaches including salting out and ultrafiltration; various kinds of column chromatographies, virtual purification of proteins with the aid of interactive softwares.</li> <li>▪ Proteomic technologies (13 hours) 2D-gel electrophoresis; N-terminal sequencing; applications of various kinds of mass spectrometric techniques; ICAT, ITAQ and ICPL techniques.</li> <li>▪ Chemical modification (7 hours) Use of chemical modification in identifying functional residues; specific reagents for individual residues; examples of the use of such;</li> <li>▪ Affinity reagents (3.5 hours) Use of affinity reagents in identifying functional residues; functional groups used in affinity reagents; ATP analogues; examples of the use of such;</li> <li>▪ DNA microarray (3 hours) Principles of DNA microarray; cDNA versus affymetrix chip; single nucleotide polymorphism (SNP) and its application in disease gene identification</li> <li>▪ Surface Plasmon Resonance (3 hours) Principle and experimental set up of SPR; association/dissociation</li> </ul>

	<p>constant determination; examples of the use of such;</p> <ul style="list-style-type: none"> <li>Real-time PCR (3 hours)</li> </ul> <p>Basic principle of real-time PCR; Concept of <math>C_T</math>, <math>\Delta C_T</math> and <math>\Delta\Delta C_T</math> and their use in quantitation; TaqMan and molecular beacon; examples of the use of such; experimental set up of real-time PCR; examples of the use of such</p>																																						
<b>Teaching/Learning Methodology</b>	<p>Lectures, Tutorials and Demonstrations</p> <p>This is an advanced subject for research students. Not only lectures, tutorials and demonstrations will be used. Teaching aids will also include softwares, open access database searches, several original journal articles that will be used in lectures/tutorials. Students are expected to read these articles and participate in the discussion on these articles during classes. Laboratory tour into the state-of-art research facilities relevant this subject will be organized.</p>																																						
<b>Assessment Methods in Alignment with Intended Learning Outcomes</b>	<table border="1"> <thead> <tr> <th rowspan="2">Specific assessment methods/tasks</th> <th rowspan="2">% weightin g</th> <th colspan="6">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th> </tr> <tr> <th>a</th> <th>b</th> <th></th> <th></th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>1. Coursework</td> <td>50</td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2. Examination</td> <td>50</td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total</td> <td>100 %</td> <td colspan="6"></td> </tr> </tbody> </table>	Specific assessment methods/tasks	% weightin g	Intended subject learning outcomes to be assessed (Please tick as appropriate)						a	b					1. Coursework	50	✓	✓					2. Examination	50	✓	✓					Total	100 %						
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<b>Reading List and References</b>	<p><u>Recommended Readings</u></p> <ol style="list-style-type: none"> <li>“Introducing Proteomics: From concepts to sample separation, mass spectrometry and data analysis” 1<sup>st</sup> edition by Josip Lovric. Wiley (2011) ISBN-10: 0470035242; ISBN-13: 978-0470035245.</li> <li>“Introduction to Proteomics: Principles and Applications (Methods of Biochemical Analysis)” 1<sup>st</sup> edition by Nawin C. Mishra. Wiley (2010) ISBN-10: 0471754021; ISBN-13: 978-0471754022.</li> <li>“Proteome research: new frontiers in functional genomics” by Wilkins MR et al. Springer-Verlag (1997) ISBN 3-540-62753-7.</li> <li>“Proteome research: mass spectrometry” by James P. Springer Verlag (2000) ISBN 3-540-67256-7</li> </ol>																																						

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