

## Subject Description Form

<b>Subject Code</b>	ABCT1D03/ABCT1303
<b>Subject Title</b>	Biotechnology and Human Health
<b>Credit Value</b>	3
<b>Level</b>	1
<b>Pre-requisite / Co-requisite/ Exclusion</b>	None
<b>Objectives</b>	<p>This subject aims to provide the students a general scientific understanding of modern major biotechnology achievements, as well as the impact of biotechnology on our society and ways of living in the context of its application to human health and disease treatment. Beginning with an introduction to the basic principles of life, emphasis is placed on using real-world examples to illustrate the close link between biotechnology and everyday living; its significant contribution to modern health care including special consideration to situations in Hong Kong and China; as well as the social and economical impact of biotechnology on human societies.</p>
<b>Intended Learning Outcomes</b>	<p>Upon completion of the subject, students will be able to:</p> <ul style="list-style-type: none"> <li>(a) understand the scientific basis of modern biotechnology development;</li> <li>(b) appreciate the application of biotechnology to human health and diseases;</li> <li>(c) acquire an analytical and critical mind through a process of questioning and problem solving.</li> </ul> <p><i>Please explain how the stated learning outcomes relate to the following three essential features of GUR subjects: Literacy, Higher order thinking, and Life-long learning</i></p> <p>Advancement in biotechnology has greatly improved human health and living in the past century. The wide-spread application of biotechnology to modern health care has brought this technically advanced subject into close contact with all of us. Furthermore the emergence of new diseases like SARS and swine flu; or biotech breakthroughs such as animal cloning stirs up intense public interest and anxiety. A well informed understanding of the scientific basics of biotechnology, as well as its application and impact to modern health care would facilitate the students to achieve better knowledge of healthy living and modern medicine.</p> <p>This subject will employ case studies as an effective learning method. Topics of high public interest and social impact, such as SARS, swine flu, cancer and human cloning etc., will be discussed in terms of both scientific fundamentals as well as biotech innovations. These studies will help the students to achieve a better understanding of such key issues relevant to our healthy living.</p> <p><u>Higher order thinking</u></p> <p>Our subject would also be beneficial for higher order thinking. Through case-based studies of examples of biotech, students will learn to apply basic scientific principles to emerging and pressing issues in public health and</p>

	<p>modern medicine, to formulate well-informed and sound judgment. Students will be encouraged to apply the background knowledge of biotechnology obtained to discuss controversial issues like the societal needs for genetically-engineered plants, use of embryonic stem cells for research purposes etc.</p> <p><u>Life-long learning</u></p> <p>Our subject would be beneficial for life-long learning. The rapid development and growth in biotech industry is poised to bring in ground-breaking discoveries that will exert huge impact on our society and transform our ways of living in the future. Our subject would provide students with the fundamental and basic scientific knowledge, as well as the higher-order thinking to effectively handle future challenges.</p> <p><u>Literacy</u></p> <p>In addition to lecture notes, students are expected to read textbooks after lectures. In addition to textbooks, we will also encourage students to read other articles obtained from newspaper, magazines and even from the web. The idea is to arouse students' interest in the subject matter. Students are expected to write an essay of 400-800 words based on a topic they choose.</p>
<p><b>Subject Synopsis/ Indicative Syllabus</b></p>	<p>THE DEVELOPMENT OF MODERN BIOTECHNOLOGY: 2 Hrs  Brief history and different areas of biotechnology  The impact of biotechnology on society</p> <p>FUNDEMENTAL PRINCIPLES OF LIFE: 2 Hrs  Cell structure and flow of genetic information  Cell metabolism, growth and development</p> <p>GENE BIOTECHNOLOGY 4 Hrs  Techniques for analyzing DNA  Human Genome Project  Genetic engineering and gene therapy</p> <p>PROTEIN BIOTECHNOLOGY 4 Hrs  Diverse uses of proteins as biotechnology products  Protein engineering for therapeutic uses</p> <p>VIRUS AND IMMUNO BIOTECHNOLOGY 4 Hrs  Virus and infectious diseases  Antibodies and vaccines</p> <p>MICROBIAL BIOTECHNOLOGY 3 Hrs  Microbial infection and antibiotics  Yeast and fermentation</p> <p>ANIMAL BIOTECHNOLOGY 4 Hrs  Genetically modified animals as disease models  Embryos, clones and animal cloning  Transgenic animal and its application</p> <p>MEDICAL BIOTECHNOLOGY 4 Hrs  Medical detection and diagnosis  Drug discovery through modern biotechnology  Stem cell technology and regenerative medicine</p> <p>GREEN BIOTECHNOLOGY 4 Hrs  Transgenic plants and biotechnology in agriculture</p>

	Green energy and biofuels																																																												
	THE BIOTECHNOLOGY INDUSTRY Economics; ethics and regulation Future strategies and challenges					2 Hrs																																																							
<b>Teaching/Learning Methodology</b>	<p><b>Lectures:</b> Lectures will be used to deliver the background knowledge including the basic knowledge of life, cells, proteins and DNA. These background knowledge will be necessary for more advanced topics in the latter part of the subject. We will use a lot of examples to illustrate the importance of biotechnology. This is critical to arouse the interest of students to learn this subject. Lectures will provide students with a detailed understanding of the topics commonly heard/seen in the media.</p> <p><b>Tutorials:</b> Exercises will be provided before or during tutorials. Students are expected to actively participate in the discussions during tutorials. Materials will be given prior to the tutorials to the students to encourage more active participations during tutorials. We will also assess the student presentations.</p> <p><b>Laboratory works:</b> practicals involving the handling of useful microbes, DNA and protein preparation/analysis. This is to keep students interested in the subject matter. In addition, we will also want the students to learn how science is investigated. Such kind of scientific thinking is one of the important topics we wish our students to be able to learn.</p> <p><b>Self-study:</b> Students will be given a reading list for their own self-study. Reading list will be extracted from the textbook used.</p> <p><b>Writing assignment:</b> an essay with 400-800 words will be graded by the teaching staff.</p>																																																												
<b>Assessment Method</b>	<table border="1"> <thead> <tr> <th rowspan="2">Specific assessment methods/tasks</th> <th rowspan="2">% weighting</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>c</th> <th>d</th> <th>e</th> <th></th> </tr> </thead> <tbody> <tr> <td>1. Quiz</td> <td>40%</td> <td>✓</td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2. Laboratory work</td> <td>20%</td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>3. Presentation</td> <td>20%</td> <td>✓</td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <td>4. Written assignment</td> <td>20%</td> <td>✓</td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total</td> <td>100 %</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>							Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)						a	b	c	d	e		1. Quiz	40%	✓	✓	✓				2. Laboratory work	20%	✓						3. Presentation	20%	✓	✓	✓				4. Written assignment	20%	✓	✓	✓				Total	100 %						
Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)																																																											
		a	b	c	d	e																																																							
1. Quiz	40%	✓	✓	✓																																																									
2. Laboratory work	20%	✓																																																											
3. Presentation	20%	✓	✓	✓																																																									
4. Written assignment	20%	✓	✓	✓																																																									
Total	100 %																																																												
<b>Student Study Effort Required</b>	Class contact:																																																												
	▪ Lecture					34 Hrs.																																																							
	▪ Tutorial					5 Hrs.																																																							
	Other student study effort:																																																												
	▪ Laboratory work					6 Hrs.																																																							
	▪ Self study					50 Hrs.																																																							
	Total student study effort						95 Hrs.																																																						

**Reading List and Reference**

**Textbook: (1) W.J. Thieman and M.A. Palladino; Introduction to Biotechnology, Second Edition, Pearson-Benjamin Cummings 2009.  
(2) R. Renneberg: Biotechnology for Beginners, Academic Press 2008**