Subject Description Form

Subject Code	ABCT4102
Subject Title	Immunotechnology
Credit Value	3
Level	4
Pre-requisite	Immunology
Objectives	To explore the theoretical and practical aspects of various modern immunological techniques in the biotechnology industry, biomedical research as well as public health applications.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. To understand various modern immunological techniques and applications in scientific and medical research with emphasis on the mode of mechanisms. b. To have in-depth understanding about production of antibodies and up-to-date concepts on the development of vaccines c. practice good technical skills, interpret and analyze data obtained in laboratory practical sessions
Subject Synopsis/ Indicative Syllabus	Lectures: (I) Laboratory techniques that utilize immune cells and antibodies (13 hours): 1. Cellular techniques: Handling and collection of animal tissues including bone marrow and spleen, isolation of lymphocyte populations including density-gradient separation (Ficoll Isopague), rosetting, panning and immunomagnetic beads, purification of various types of white blood cells, including multi-color fluorometry, flow cytometry and magnetic cell separation, effector cell assays such as plague-forming cell assay, Enzyme-linked immune SPOT (ELISPOT) assay, lymphocyte-stimulation test and cytotoxicity assay, complement assays, gene targeting and transgenic animals. (6 hours) 2. Use of antibodies based techniques: Production of antibodies in model animals (including rats, rabbits and chickens), purification of polyclonal antibodies, monoclonal antibodies production, conjugation and labeling of antibodies, concept of equivalence, immunodiffusion, rocket as well as crossed-immunoelectro-phoresis, immunoassays including radioimmunoassay (RIA), Enzyme-linked immunosorbent assay (ELISA), competitive assay, two-site capture assay, immunoblotting and immunoprecipitation, immunohistochemistry, immuno-fluorescence. (7 hours). (II) Vaccinology (13 hours) 1. Basic concepts including the different types of vaccines, immune targets for protection, immune enhancement for polysaccharides targets by conjugation to other proteins, use of adjuvants and different ways of vaccine application (injections and others) and commonly used vaccines. (7 hours) 2. Making a vaccine: Vaccine development and licensure, disease burden analysis for new vaccine, technologies for new vaccine preparation and formulation, regulatory processes for new vaccine approval, vaccine formulation, pre-clinical and clinical assessments (3 hours) 3. Assessments of immunogenicity in vaccine evaluation, immune correlates of protection, vaccine safety analysis, evaluation of immune duration and concept on regular immune boosting for the maintenance of immunity. (3 hours)

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<tr><td></td><td>Laboratory practical sessions:
These include experiments on the preparation of antigens for injection purposes aiming to produce antibodies, purification of IgY from egg yolk, ELISA, Dot-blotting, antiserum production, immunohistochemistry, handling and collection of animal tissues including bone marrow and spleen, and isolation of immune cells from spleen using differential centrifugation, immunoprecipitation. Responses of immune cells to the presence of pathogen-associated-molecular-patterns (PAMPs). (15 hours)</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>Aiming at intended learning outcome (a), lectures are designed to foster understanding of concepts and principles of immunological techniques, improve the student's ability to reason scientifically, and promote understanding and appreciation of immunological research. An active classroom approach is reinforced by teaching aids such as the personal response system. Multimedia means will be used to facilitate conceptual learning. Tutorials are organized to reinforce gasping of concepts and gauzing the progress of students. Tutorials are organized to reinforce gasping of concepts and gauzing the progress of students. Through the active participation of students and peer-teaching, intended learning outcome (b) will be addressed as students will have a good gasp of the theoretical basis of the various immunological techniques. Further, to address intended learning outcome (c), laboratory practical sessions will be assessed and students will be encouraged to develop a thorough understanding of various scientific methods and modern approaches of immunological techniques in the new world that are important for the biotechnology industry, biomedical research as well as from the public health perspectives. Through data analysis and interpretation of the data from laboratory practical sessions, the intended learning outcome will also be addressed. Moreover, students will be encouraged to develop a critical approach to problem solving, data handling, and graphics.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="6">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td></td><td></td><td></td></tr>
<tr><td>1. Final examination</td><td>45</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td><td></td></tr>
<tr><td>2. Mid-term examination</td><td>30</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>3. Laboratories/practical work</td><td>20</td><td></td><td>✓</td><td>✓</td><td></td><td></td><td></td></tr>
<tr><td>4. Attendance</td><td>5</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>
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Students are required to attend at least 75% of scheduled sessions for the subject.
Students fail to fulfill the attendance requirement will lose the 5% attendance score.</td></tr>
<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lectures</td><td>26 Hrs.</td></tr>
<tr><td>▪ Tutorials</td><td>8 Hrs.</td></tr>
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	▪ Laboratories/practical work	15 Hrs.
	Total class contact:	49 Hrs.
	Other student study effort:	
	▪ Student centred problem based learning at home	100 Hrs.
	Total student study effort	149 Hrs.
Reading List and References	1. Cochet O, Teillaud JL, Sautès C. Immunological Techniques Made Easy. 1st Edition reprint, 2000, John Wiley, New York. 2. Roitt I, Brostoff J, Male D. Immunology, 4th Edition, Mosby, 1998. 3. Male D., Brostoff J., Roth D.B. and Roitt I. Immunology. 7th Edition, Mosby, 2006. 4. Lo. S.C.L. Laboratory manual of Immunbiology. 2nd Edition, Department of Applied Biology and Chemical Technology, The Hong Kong Polytechnic University, 2008.	