Module Details

Module Code:	PHAR S7Z01
Full Title:	Immunology APPROVED
Valid From::	Semester 1 - 2018/19 (September 2018)
Language of Instruction:	
Duration:	1 Semester
Credits::	7.5
Module Owner::	Bridget Kelly
Departments:	Unknown
Module Description:	To provide students with a good understanding of the integrated action of the multi-component immune system. To gain skills in immunological laboratory techniques. To be able to apply immunological concepts to their own research.

Module Learning Outcome	
On successful completion of this module the learner will be able to:	
#	**Module Learning Outcome Description**
MLO1	Recognise the levels of defense of the body (i.e. physical & chemical barriers/innate system/adaptive system).
MLO2	Summarise the role of the different organs and cell types of the immune system.
MLO3	Grasp and apply the principles and applications of a range of immunological practical techniques.
MLO4	Examine the role of antibodies in the immune system and also in diagnostic approaches.
MLO5	Differentiate the characteristics and activation processes of the cell types involved in the humoral and cell-mediated immune responses.

Pre-requisite learning
Module Recommendations   *This is prior learning (or a practical skill) that is strongly recommended before enrolment in this module. You may enrol in this module if you have not acquired the recommended learning but you will have considerable difficulty in passing (i.e. achieving the learning outcomes of) the module. While the prior learning is expressed as named DkIT module(s) it also allows for learning (in another module or modules) which is equivalent to the learning specified in the named module(s).*
No recommendations listed

Module Indicative Content	

Immunology Systems
Overview of the mechanical, chemical and physical barriers, The innate system and the adaptive system.

Biology / biochemistry of immune reactions
Immune cells (NK cells, B cells, Th cells, Tc cells, neutrophils, monocytes, granulocytes). Lymphoid organs (thymus, lymph nodes, spleen, bone marrow, Peyer's patches). Cell migration and chemotaxis. Intracellular signalling pathways. Antigen recognition, processing and presentation. Complement system.

Receptors of the innate immune system
Pre-formed receptors, e.g. Pattern Recognition receptors, Toll like receptors, Fc receptors, complement receptors etc.

Biochemistry of antibodies
Immunity overview (incl. specific / non-specific and innate / adaptive immune system). Antibody structure, function, diversity (type) and mode of action (hapten / epitope). Antigen-antibody interaction (agglutination). Monoclonal / polyclonal antibodies will be covered in detail considering their current role as biopharmaceuticals. Effector functions of antibodies will also be covered in detail.

Biological / Medical application
Transplantation and transfusion. Vaccination and immunotherapy. Allergies and autoimmunity. Immune diseases / tumour immunology / immunodeficiency (incl. AIDS). Immunity to bacteria, viruses and fungi. Hypersensitivity (I, II, III, IV, V). Antibody response levels. Antibody labelling (radio-labelling / fluorescent labelling). Binding assays (qualitative / quantitative methods / Scatchard plots). Blood-grouping (ABO / Rhesus).

Other Immunology Processes
Engulfment by phagocytosis/macropinocytosis; Antigen display on Major Histocompatibility Complexes. The role of T cell receptors, cytokines and the humoral system in response to antigen detection. Gene rearrangement in B cells.

Immunology Methodological theory
ELISA, Immunohistochemistry, western blotting, Flow cytometry, controls, etc. will all be discussed in detail. Antibody labelling (radio-labelling / fluorescent labelling). Binding assays (qualitative / quantitative methods / Scatchard plots). Blood-grouping (ABO / Rhesus).

Practical component
Immunology practicals will align with theory and will be selected from the following: Visualisation (histochemical staining) / counting of immune cells; Lymphocyte isolation / purification; Proliferation of lymphocytes; Fractionation of serum proteins (e.g. ammonium sulphate precipitation); Immuno-diffusion tests (e.g. gel diffusion precipitation); Characterisation of purified antibody by SDS-PAGE; Enzyme Linked ImmunoSorbent Assay (ELISA); Serial dilution, preparation & analysis (e.g. ELISA) of immunological samples; Qualitative / quantitative agglutination / ELISA tests; Complement fixation test; Blood-grouping (ABO / Rhesus); Affinity chromatography

Teaching and Learning Strategy
Content delivery will comprise of lectures and student led PBL sessions. Lectures will consist of a range of methodology including on-line movie animations, visual demonstrations, etc. Other technology such as classroom response systems, online quizzes, discussion forums will complement the face to face lectures. PBL sessions: a choice of topics will be covered using problem based learning strategies, whereby students will take part in peer learning and both the process and product of the PBL will be assessed.

Module Assessment

Assessment Breakdown	%
Project	20.00%
Practical	30.00%
Final Examination	50.00%

Module Special Regulation

Assessments

Full Time On Campus

No Course Work

Project			
Assessment Type	Group Project	**% of Total Mark**	20
Marks Out Of	0	**Pass Mark**	0
Timing	n/a	**Learning Outcome**	1,2,4,5
Duration in minutes	0		

Assessment Description
Students will participate in a group project which may be a traditional group project or Problem Based Learning (PBL) based, on a topic relevant to material covered in the lectures. Both the process and the product of the group project will be assessed.

Practical			
Assessment Type	Practical/Skills Evaluation	**% of Total Mark**	30
Marks Out Of	0	**Pass Mark**	0
Timing	n/a	**Learning Outcome**	3,4
Duration in minutes	0		

Assessment Description
Students will participate in weekly laboratory-based practical sessions in which formative assessments will be performed(e.g. problem based learning, quizzes, protocol review exercises, worksheet completion etc.). Summative assessment may take the form of graded laboratory reports and/or graded lab skill assssments

Final Examination			
Assessment Type	Formal Exam	**% of Total Mark**	50
Marks Out Of	0	**Pass Mark**	0
Timing	End-of-Semester	**Learning Outcome**	1,2,3,4,5
Duration in minutes	0		

Assessment Description
End-of-Semester Final Examination

Module Workload

Workload: Full Time On Campus

Workload Type	Contact Type	Workload Description	Frequency	Average Weekly Learner Workload	Hours
Lecture	Contact	2.5 x 1 hour lectures	Every Week	2.50	2.5
Practical	Contact	1 x 3 hour lab session	Every Week	3.00	3
Lecturer Supervised Learning	Contact	1 X 0.5 hour PBL session	Every Week	0.50	0.5
Directed Reading	Non Contact	Notes / Paper / Textbook reading	Every Week	2.00	2
Independent Study	Non Contact	Self / group study	Every Week	5.00	5
				Total Weekly Learner Workload	13.00
				Total Weekly Contact Hours	6.00

This module has no Part Time On Campus workload.

Module Resources

Recommended Book Resources

Delves, P.J., Martin, S.J., Burton, D.R., Roitt, I.M.. (2017), Roitt's essential immunology, 13. Wiley-Blackwell, p.576.

Ivan Roitt, Arthur Rabson & Peter J. Delves. (2005), Really essential medical immunology, 2nd. Oxford : Blackwell Science.

Jeremy M. Berg, John L. Tymoczko, Lubert Stryer.. (2007), Biochemistry, 6th. New York : W.H. Freeman.

Harvey Lodish, Arnold Berk, Chris A. Kaiser, Monty Krieger, Matthew P. Scott, Anthony Bretscher, Hidde Ploegh, Paul Matsudaira. (2007), Molecular Cell Biology, W. H. Freeman.

Male, D.K., Brostoff, J., Roth, D. and Roitt, I.. (2007), Immunology, 7th. Elsevier.

This module does not have any article/paper resources

Other Resources

Website, Irish Society for Immunology - http://www.irishimmunology.ie.

Website, British Society for Immunology: http://www.immunology.org.

Website, Nature Immunology Journal Collection: http://www.nature.com/immuno/index.html.

Website, Nature Reviews in Immunology: http://www.nature.com/nri/index.html.

Website, The Journal of Immunology: http://www.jimmunol.org.