



The University of Southern Queensland

Course specification

Description: Immunology and Microbial Pathogenesis						
Subject	Cat-nbr	Class	Term	Mode	Units	Campus
BIO	3315	40907	1, 2005	ONC	1.00	Toowoomba

Academic group:	FOSCI
Academic org:	FOS002
Student contribution band:	2
ASCED code:	010911

STAFFING

Moderator: Michael Kotiw

REQUISITES

Pre-requisite: BIO2205

RATIONALE

The course aims to provide a thorough understanding of the essential principles of immunity, the ability to distinguish self from non-self antigens, immunochemistry, immunobiology, immunogenetics, abnormal immune responses including autoimmunity and allergies/hypersensitivities and cancer immunology. Emphasis will also be given to principles underpinning prokaryotic-eukaryotic cell interactions which contribute to the development of therapeutic strategies against devastating diseases of humans or animals.

SYNOPSIS

This course emphasises the concepts underpinning humoral or cellular host defence mechanisms which respond to intrusion by foreign invaders including induction of protection against devastating microbial diseases or altered/mutated self-antigens or -cells. The course includes a study of innate defence mechanisms, antigenic specificity, induction of humoral and cellular immune responses, immunoglobulin structure, function and genetic basis of antibody diversity, the role of the immune system in health and disease including cell-mediated immunity, hypersensitivity reactions, autoimmunity, immune tolerance, cancer immunology and vaccine development strategies. The course also leads students to discover the significance of the mechanisms of microbial pathogenesis at the prokaryotic-eukaryotic cell level in the development of the new generation vaccines against some of the biggest scourges affecting human or animal life on this planet. The practical component of the course is intended to provide students with hands-on experience with immunological techniques of relevance to aspects relating to the fields of microbial, animal and plant biotechnologies and biomedical sciences, thus providing students with alternative career choices for their future.

OBJECTIVES

On completion of this course students will be able to:

1. demonstrate an appreciation of the basic principles and molecular mechanisms of microbial pathogenesis including adhesion and invasion;
2. demonstrate the role played by the bacterial virulence factors including endotoxins and protein toxins representing different secretion systems as agents of disease and probes of eukaryotic cell behaviour;
3. describe different classes/subclasses of immuno-globulins/antibodies, their structure and functions;
4. demonstrate an understanding of the concept of antibody specificity and its chemical basis;
5. describe the role played by the innate defence mechanisms including inflammatory response, antiphagocytic mechanisms, complement and the role played by cytokines in protection against infectious disease and cancer;
6. demonstrate an understanding of the genetic basis of diversity of effector molecules participating in the induction of immune responses;
7. describe components of the complement system and its function in host defence;
8. describe the current concepts in the generation of humoral and cellular immune response;
9. describe the phenomenon of autoimmunity as a disease process;
10. describe the T-B cell paradigm particularly in relation to selected intracellular infectious diseases;
11. describe different types of hypersensitivities and their role in health and disease;
12. describe the current concepts in vaccine development and their success in today's world;
13. describe the immunological basis for rejection/acceptance of cell/organ transplants;
14. demonstrate an understanding and describe the action of cytokines including the bases of endotoxin-induced cytokine-induced injury;
15. discuss the role played by immunochemical and immunobiological techniques in the development of new generation vaccines;
16. describe the current state of developments in the field of cancer immunology;
17. describe the concept of humanised monoclonal antibodies and discuss their significance of immunotherapeutics;
18. perform the basic serological techniques such as those used in immunohaematology and for the diagnosis of infectious diseases;
19. perform dot and/or western blotting to enable identification of antigens and demonstration of antibody specificity.

TOPICS

	Description	Weighting (%)
1.	Molecular and Cellular Basis of Immune Response; Innate Defence Mechanisms; Antigens/Haptens: Serological Basis of specificity; Cells and Tissues of the Immune System; Complement System; Immunoglobulin Structure and Function; Molecular Basis of Antibody and MHC Diversity; Hypersensitivity Reactions and Dilemmas; Cytokines; Autoimmunity vs. tolerance; Oncogenes and Cancer Immunology; Immunological Reagents in Disease Diagnosis and Therapeutics; New Generation Preventative Immunological Strategies.	85.00

2. Eukaryotic cell response to prokaryotic assault in model systems 15.00
involving: microbial adhesion and microbial pathogens and their
products including endotoxins and exotoxins.

TEXT and MATERIALS required to be PURCHASED or ACCESSED

ALL textbooks and materials are available for purchase from USQ BOOKSHOP (unless otherwise stated). Orders may be placed via secure internet, free fax 1800642453, phone 07 46312742 (within Australia), or mail. Overseas students should fax +61 7 46311743, or phone +61 7 46312742. For costs, further details, and internet ordering, use the 'Textbook Search' facility at <http://bookshop.usq.edu.au> click 'Semester', then enter your 'Course Code' (no spaces).

Coico, R, Sunshine, G & Benjamini, E *Immunology*, 5th edn, Wiley-Liss,
(a short course)

Mukkur, TK 2005, *Practical immunology*, USQ Publication, Toowoomba.

REFERENCE MATERIALS

Reference materials are materials that, if accessed by students, may improve their knowledge and understanding of the material in the course and enrich their learning experience.

Alberts, B et al 1994, *The molecular biology of the cell*, 3rd edn, Garland, New York.

Baron, S (ed) 1996, *Medical microbiology*, 4th edn, University of Texas, Galveston.

Brown, F 1994, *Recombinant vectors in vaccine development*, Karger, Basel, New York.

Brown, F et al 1993, *Vaccine design*, Chichester, New York.

Glazer, AN & Nikaido, H 1995, *Microbial biotechnology: Fundamentals of applied microbiology*, WH Freeman and Company, New York.

Glick, BR & Pasternak, JJ 1994, *Molecular biotechnology: Principles and applications of recombinant DNA*, ASM Press, Washington, DC.

Goldsby, RA, Kindt, TJ & Osborne, BA 2005, *Kuby immunology*, 5th edn, WH Freeman and Co,

Henderson, B et al 1999, *Cellular microbiology*, Wiley, New York.

Janeway, CA, Travers, P, Walport, A & Shloinchik, M 2001, *Immunology*, 5th edn, Churchill Livingstone, New York.

Liddell, JE & Cryer, A 1991, *A Practical guide to monoclonal antibodies*, Wiley, New York.

Mandell, et al 2000, *Mandell, Douglas and Bennett's principles and practice of infectious diseases*, 5th edn, Churchill Livingstone, New York, Vol 1&2.

Mims, C et al 1998, *Medical microbiology*, 2nd edn, Mosby, St Louis.

Murray, PR et al 2002, *Medical microbiology*, 4th edn, Mosby, St Louis.

Peters, J & Baumgarten, H (eds) 1992, *Monoclonal antibodies: A practical guide*, Springer-Verlag, New York.

Roitt, I, Brostoff, J & Male, D 2001, *Immunology*, 6th edn, Mosby, London.

Ryan, KJ 1994, *Sherris medical microbiology*, 3rd edn, Appleton & Lange, Norwalk, Conn.

Salyers, AA & Whitt, DD 2002, *Bacterial pathogenesis: A molecular approach*, 2nd edn, ASM Press, Washington.

Samelson, LE (ed) 1994, *Lymphocyte activation*, Karger, Basel.

Talwar, GP, Rao, K & Chauhan, VS 1994, *Recombinant and synthetic vaccines*, Springer-Verlag, New York.

Talwar, GP & Sood, OP 2003, *Therapeutic Antibodies*, Ranbaxy Science Foundation, Gurgaou, India.

STUDENT WORKLOAD REQUIREMENTS

ACTIVITY	HOURS
Examinations	5.00
Laboratory or Practical Classes	24.00
Lectures	26.00
Private Study	103.00
Tutorials	2.00

ASSESSMENT DETAILS

Description	Marks out of	Wtg(%)	Due date
2HR OPEN TEST	20.00	20.00	01 Mar 2005 (see note 1)
3HR CLOSED EXAMINATION	80.00	80.00	END S1 (see note 2)

NOTES

1. Examiner to advise the date for the open test.
2. Examination dates will be available during the Semester. Please refer to the examination timetable when published.

IMPORTANT ASSESSMENT INFORMATION

- 1 Attendance requirements:
It is the students' responsibility to attend and participate appropriately in all activities (such as lectures, tutorials, laboratories and practical work) scheduled for them, and to study all material provided to them or required to be accessed by them to maximise their chance of meeting the objectives of the course and to be informed of course-related activities and administration. To maximize their chances of satisfying the objectives of the practical component of the course, students should attend and actively participate in the laboratory sessions in the course.
- 2 Requirements for students to complete each assessment item satisfactorily:
To complete each of the assessment items satisfactorily, students must obtain at least 50% of the marks available for each assessment item.
- 3 Penalties for late submission of required work:
Not applicable to this course as there are no assignments.
- 4 Requirements for student to be awarded a passing grade in the course:

To be assured of receiving a passing grade a student must achieve at least 50% in each of the summative assessments and at least 50% of the available weighted marks for the summative assessment items.

- 5 Method used to combine assessment results to attain final grade:
The final grades for students will be assigned on the basis of the weighted aggregate of the marks (or grades) obtained for each of the summative assessment items in the course.
- 6 Examination information:
In a Closed Examination, candidates are allowed to bring only writing and drawing instruments into the examination.
- 7 Examination period when Deferred/Supplementary examinations will be held:
Any Deferred or Supplementary examinations for this course will be held in the fourth week of the semester following this course offering and the examiner will advise students involved in writing of the date time and location of any such examination.
- 8 University Regulations:
Students should read USQ Regulations 5.1 Definitions, 5.6. Assessment, and 5.10 Academic Misconduct for further information and to avoid actions which might contravene University Regulations. These regulations can be found at the URL <http://www.usq.edu.au/corporateservices/calendar/part5.htm> or in the current USQ Handbook.

ASSESSMENT NOTES

- 9 Students, who, for medical, family/personal, or employment-related reasons, are unable to sit for the test or the examination at the scheduled time may apply to defer an assessment in a course. Such a request must be accompanied by appropriate supporting documentation. One of the following temporary grades may be awarded IDS (Incomplete - Deferred Examination); IDM (Incomplete - Deferred Make-up); IDB (Incomplete - Both Deferred Examination and Deferred Make-up).
- 10 In order to attend laboratory classes, students must provide and wear appropriate personal protective equipment. This shall include a laboratory coat, closed in shoes, and safety glasses. Such equipment must be approved by supervising staff. Failure to provide and wear the appropriate safety equipment will result in students being excluded from classes.