The University of Southern Queensland

Course Specification

Description: Immunology And Microbial Pathogenesis

<table>
<thead>
<tr>
<th>Subject</th>
<th>Cat-Nbr</th>
<th>Class</th>
<th>Term</th>
<th>Mode</th>
<th>Units</th>
<th>Campus</th>
</tr>
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<tr>
<td>BIO</td>
<td>3315</td>
<td>21176</td>
<td>1, 2003</td>
<td>ONC</td>
<td>1.00</td>
<td>TWMBA</td>
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Academic Group: FOSCI
Academic Org: FOS002
HECS Band: 2
ASCED Code: 010911

STAFFING
Examiner: TK Mukkur
Moderator: Michael Kotiw

PRE-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 and cancer immunology. 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 molecular and cellular 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:

- demonstrate an appreciation of the basic principles and molecular mechanisms of microbial pathogenesis including adhesion and invasion;
- demonstrate the role played by the bacterial protein toxins representing different secretion systems as agents of disease and probes of eukaryotic cell behaviour;
- describe different classes/subclasses of immuno-globulins/antibodies, their structure and functions;
- demonstrate an understanding of the concept of antibody specificity and its chemical basis;
- 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;
- demonstrate an understanding of the genetic basis of diversity of effector molecules participating in the induction of immune responses;
- describe components of the complement system and its function in host defence;
- describe the current concepts in the generation of humoral and cellular immune response;
- describe the phenomenon of autoimmunity as a disease process;
- describe the T-B cell paradigm particularly in relation to tuberculosis and leprosy;
- describe different types of hypersensitivities and their role in health and disease;
- describe the current concepts in vaccine development and their success in today's world;
- describe the immunological basis for rejection/acceptance of cell/organ transplants;
- demonstrate an understanding and describe the action of cytokines including the bases of endotoxin-induced cytokine-induced injury;
- discuss the role played by immunochemical and immunobiological techniques in the development of new generation vaccines;
- describe the current state of developments in the field of cancer immunology;
- demonstrate the concept of monoclonal antibodies and discuss the significance of immunotherapeutics;
- purify immunoglobulins and conjugate them to enzymes or fluorescent dyes for use in immunofluorescence or enzyme-linked immunosorbent assays;
- perform phagocytic and lymphocyte proliferation assays;
- perform the basic serological techniques such as those used in immunohaematology and for the diagnosis of infectious diseases;
- perform dot/western blotting to enable identification of antigens.
TOPICS

<table>
<thead>
<tr>
<th>Description</th>
<th>Weighting (%)</th>
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<tbody>
<tr>
<td>1. Eukaryotic cell response to prokaryotic assault in model systems involving: Microbial adhesion; Bacterial invasion; Viral invasion; Bacterial protein secretion systems as agents of disease.</td>
<td>25.00</td>
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<td>2. 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.</td>
<td>75.00</td>
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</table>

TEXT and MATERIALS required to be PURCHASED or ACCESSED:

Books can be ordered by fax or telephone. For costs and further details use the 'Book Search' facility at http://bookshop.usq.edu.au by entering the author or title of the text.


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.


**STUDENT WORKLOAD REQUIREMENTS**

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>HOURS</th>
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<tbody>
<tr>
<td>Assessment</td>
<td>3</td>
</tr>
<tr>
<td>Examinations</td>
<td>3</td>
</tr>
<tr>
<td>Laboratory or Practical Classes</td>
<td>40</td>
</tr>
<tr>
<td>Lectures</td>
<td>26</td>
</tr>
<tr>
<td>Private Study</td>
<td>86</td>
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<td>Tutorial</td>
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**ASSESSMENT DETAILS**

<table>
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<tr>
<th>Description</th>
<th>Marks Out of</th>
<th>Wtg(%)</th>
<th>Required</th>
<th>Due Date</th>
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<tbody>
<tr>
<td>LABORATORY PROJECT REPORT</td>
<td>20.00</td>
<td>20.00</td>
<td>Y</td>
<td>04 Mar 2003</td>
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<tr>
<td>PROJECT PRESENTATION</td>
<td>10.00</td>
<td>10.00</td>
<td>Y</td>
<td>04 Mar 2003</td>
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<tr>
<td>1HR MID-TERM CLOSED TEST</td>
<td>20.00</td>
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<td>Y</td>
<td>04 Mar 2003</td>
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<tr>
<td>3HR CLOSED EXAMINATION</td>
<td>50.00</td>
<td>50.00</td>
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<td>END S1</td>
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</table>

**NOTES:**
- Examiner to advise the due date for Project Report
- Examiner to advise date for Project Presentation
- Examiner to advise the date of the mid-term closed test
- 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. To complete each of the assignments satisfactorily, students must obtain at least 50% of the marks available for each assignment. To complete the examination satisfactorily, students must obtain at least 50% of the marks available for the examination.

3 Penalties for late submission of required work:
   If students submit assignments after the due date without prior approval then a penalty of 10% of the total marks available for the assignment will apply for each working day late.

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/SECARIAT/calendar/Part5/ or in the printed version of the current USQ Handbook.
ASSESSMENT NOTES

9 In accordance with University policy, the examiner may grant an extension of the due date of an assignment in extenuating circumstances. The faculty will normally only accept assessments that have been written, typed or printed on paper-based media. The Faculty will NOT accept submission of assignments by facsimile.

10 Students who do not have regular access to postal services or who are otherwise disadvantaged by these regulations may be given special consideration. They should contact the examiner of the course to negotiate such special arrangements.

11 Students, who, for medical, family/personal, or employment-related reasons, are unable to complete an assignment or to sit for an 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).