Unit Details

Unit Index No: 311421
Credit Points: 25 credit points upon successful completion of this unit
Pre-requisite Units: Medical Laboratory Science 132, Human Biology 134 or any previous version
Unit Coordinator: Associate Professor Trilochan MUKKUR
Address: School of Biomedical Sciences
Curtin University of Technology
GPO Box U1987
PERTH WA 6845
Email: T.Mukkur@curtin.edu.au
Phone: (08) 9266.7520
Fax: (08) 9266.2342

Method of Assessment

To pass this unit you must complete the assessment tasks listed below. Fill in your mark for each component as you receive it to keep track of your progress.

<table>
<thead>
<tr>
<th>Assessment Tasks</th>
<th>Applies to</th>
<th>Due Date</th>
<th>Worth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practical Test</td>
<td>Practicals</td>
<td>May 26</td>
<td>30%</td>
</tr>
<tr>
<td>Practical Notebook</td>
<td>Practicals</td>
<td>May 27</td>
<td>5%</td>
</tr>
<tr>
<td>Midterm Test</td>
<td>Theory</td>
<td>April 11</td>
<td>15%</td>
</tr>
<tr>
<td>Final Theory Examination</td>
<td>Lectures</td>
<td>Examination Period</td>
<td>50%</td>
</tr>
</tbody>
</table>

TOTAL 100%

Detailed information on assessment in this unit can be found in the sections of this plan titled 'Assessment Format' and 'Assessment Details'.

Please read this outline fully before commencing your study in this unit.

Acknowledgement: This document uses a template developed and provided by Ms Dianne Budd and includes text appearing in the original document.
Welcome

Welcome to Molecular and Cellular Immunology 231

If you are reading this, you should be enrolled in the unit Molecular and Cellular Immunology 231 which is a prescribed unit for the course leading to the Degree of Bachelor of Science (Molecular Genetics and Biotechnology).

Alternatively, you may be undertaking this unit as an additional unit (or an elective) if you are enrolled in the Bachelor of Science (Multidisciplinary Science), Bachelor of Science (Human Biology) or some other Bachelor Degree at Curtin. The unit may also be recognized as an approved unit to be credited towards a degree offered by another university.

If none of the above apply to you, check with the unit coordinator whether you should be enrolled in this unit.

Broadly speaking, Molecular and Cellular Immunology 231 focuses upon the structure and functions of the immune system, including both innate and adaptive immunity, and their inter-relationships in health and disease. The intricate and tight inter-relationship between immunology and prokaryotic and eukaryotic molecular biology will become evident in this unit. We also discover how some immunological methods are used and applied in a wide variety of scientific fields notably eukaryotic molecular biology, molecular microbiology, orthodox and complimentary medicine, medical and veterinary infectious disease microbiology, medical biochemistry, exercise physiology, neuroscience, forensic science, and important aspects of drug discovery leading to a vast array of career options. It is my role to assist you in discovering immunology as a comparatively young discipline of science and finding the unit enjoyable, challenging and rewarding in terms of the time and effort you invest in it.

Please read this document carefully. It explains everything you need to know about Molecular and Cellular Immunology 231 and how it will operate.

Please do not hesitate to contact me at any stage if you have any questions, queries or comments on the unit.

Dr T K S Mukkur (Associate Professor)
Unit Coordinator
Molecular and Cellular Immunology 231

Requirements to Complete the Unit

Prerequisite skills
The content covered in Molecular and Cellular Immunology 231 assumes that you have successfully completed Medical Science 132 or Human Biology 134 or any other previous version and:

1. are familiar with structure and function of the body as covered in Human Biology
2. understand the bases of the disciplines of Medical Science
3. are competent in English, mathematics and chemistry
4. have reasonable written and verbal communication skills
5. can effectively source, access and use library resources (printed and electronic).

Laboratory charge
No charges or levies are applied to students in this unit for their use of the laboratory. However, you will need to download a copy of the practicum exercises for each week posted on the unit’s Blackboard site.
**Technology**

It is helpful, but not essential, that you have access to:

- a computer with an Internet connection, which you can use effectively
- email (preferred), a telephone or a fax machine to contact your tutor and other students studying the same unit.

You can access the computing facilities on campus if you can do not have access to a computer at home.

**Aims**

The unit Molecular and Cellular Immunology 231 is designed to develop your understanding of the physiology of the immune system and its role in health and disease. Another aim of this unit is to impart you with basic technical skills acquired in performing selected immunological procedures that are highly likely to be relevant to your chosen career option. Overall, you will develop an understanding of the roles of immunology and immunological techniques used in different fields of biomedical sciences particularly molecular biological, basic and clinical subjects in medical laboratory sciences such as clinical biochemistry and medical microbiology, clinical immunology, haematology, histopathology etc., proteomics, forensic science, cancer biology and drug discovery.

Molecular and Cellular Immunology 231 seeks to build on the foundations provided by Medical Laboratory Science unit 132 and improve your abilities to retrieve, analyse and evaluate relevant information, enhance your problem solving and decision making skills and provide additional opportunities to work as part of a team. These skills need to be combined with good written and verbal communication abilities and effective interpersonal skills. Scientists with these skills are valued employees in laboratories and are sought after by employers.

**Unit Outcomes**

**Learning outcomes (Content knowledge)**

This unit is designed to introduce you to both theoretical and practical aspects of immunology. On successful completion of this unit you will be able to:

- describe the structure and functions of the organs of the immune system in the induction of immune responses to foreign invaders and define the roles of the immune system in normal individuals
- demonstrate comprehension of the processes involved in the induction and expression of immune responses
- Explain the structure and function of antibodies, concepts underpinning monoclonal antibody technology, and the genetic basis of antibody and T cell receptor diversity
- demonstrate comprehension of the concepts underpinning generation of systemic versus mucosal immunity and their relevance in the development of vaccine against foreign invaders
- demonstrate an understanding of the concepts underpinning the aetiology of immune dysfunction
- demonstrate an understanding of the concepts underpinning basic laboratory skills relevant to selected immunologically based methods as used in research and diagnostic techniques in biomedical sciences, clinical immunology, clinical biochemistry, forensic science, cancer biology and drug discovery.
Professional skills outcomes
On successful completion of this unit you will have completed tasks that will have developed the following skills:

Effective communication
Communicating with your lecturer and other students enrolled in Molecular and Cellular Immunology 231.
Use of written, verbal and electronic media

Analysis and evaluation of information
Accessing, analysing and critically evaluating relevant information
Completing self-study and practical exercises (in partnership)

Problem solving and decision making
Setting aside time to study, research and review topic items
Reviewing lecture materials
Submitting answers to the questionnaires
Completion of assessments

Teamwork
Completing practical exercises in partnership with other student(s)
Revision and discussion of topic items

Practical competence
"Hands-on" experiments in practical sessions
Completion of practical exercises competently and safely

Awareness of issues affecting health professionals
Development of high ethical standards
Knowledge of the inter-relationship between science disciplines and their interrelationships

Syllabus
The unit Molecular and Cellular Immunology 231 comprises ten [10] topics in immunology that are central to the appreciation of, and relevance to different career options particularly for students majoring in molecular biotechnology and biomedical sciences getting them “JOB READY”, through confidence gained in the unit, in the application of Molecular and Cellular immunology concepts and hands-on practical experience in problem-solving.

The topics are:

01 Structure and functions of the immune system
02 Lymphocyte physiology and their cell membrane antigen systems
03 Immunogens and characteristics; Antibody structure and function; principles and applications of monoclonal antibody technology.
04 Antigen-antibody reactions and immunoassays
05 The MHC Complex and its role
06 Cytokines in health and disease
07 The complement system
08 Immunopathology – Hypersensitivity, Immunological tolerance and introduction to autoimmune diseases
09 Immunodeficiencies, and application of immunological concepts to tumor immunology
10 Systemic and mucosal Immunity to bacterial, viral and parasitic infectious diseases, and carcinomas

Syllabus - summary

1. Structure and functions of the immune system

2. Lymphocyte physiology and their cell membrane antigen systems
Lymphocytes - classes, subclasses and identification - cell receptors and markers detection and enumeration. T and B cells - cooperation. Lymphocyte recirculation pathways. Cytokines. The consequences of contact with antigen - normal vs immune individuals.

3. Immunogens and characteristics, Antibody structure and function, and principles and applications of monoclonal antibodies

4. Antigen-antibody reactions and immunoassays

5. The MHC Complex and its role
Historical aspects. Graft rejection - host vs graft and graft vs host. The MHC gene complex and its products. Major Histocompatibility antigens - structure of Class 1 and Class II antigens and their biological significance in role in antigen processing and presentation, and graft rejection disease associations.
6. **The complement system**
The complement system - components and nomenclature. Properties and functions - complement mediated cytolyis. Complement activation – recognition, activation and membrane attack. Complement assays - functional vs component assays, complement fixation test and functional assays such as the bactericidal assay.

7. **Cytokines in health and disease**
History and general properties of cytokines, Functions categories of cytokines, cytokine receptors and signal transduction, Role of cytokines and cytokine receptors in disease, therapeutic and diagnostic application of cytokines.

8. **Immunopathology – Hypersensitivity, Immunological tolerance and autoimmune diseases**
Classification of hypersensitivities - Types 1 II, III and IV. Mechanisms and consequences of hypersensitivities – immunopathology, introduction to mechanisms underpinning Immunological tolerance. Autoimmune responses and their consequences - selected examples.

9. **Immunodeficiencies, and application of immunological concepts to tumor immunology**

10. **Systemic and mucosal Immunity to bacterial, viral and parasitic infectious diseases**
Host defense against the various classes of microbial pathogens, mechanisms by which the pathogens evade the immune system, principles and objectives of immunization. Active versus passive immunization. Basic mechanisms of protection against extracellular vs intracellular pathogens of bacterial, viral and parasitic origins. Recent approaches to the design of vaccines with emphasis on the mucosally-acquired diseases.

**Unit Materials**

**Unit outline**
The unit outline (this document) gives you important information about the general aims of the unit, texts and references, and details about the assessment, including allocation of marks, grading criteria and submission dates. You should make this unit outline the first document that you read for the unit. Study it carefully, paying particular attention to assessment instructions and submission dates.

**Textbook**
The text for this unit is:


This textbook is seriously supplemented with material from the recommended textbooks and recent papers published in high impact immunology journals.
Reference texts

(v) Mishell BB, Shigii SM (1980) Selected Methods in Cellular Immunology. WH Freeman and Company Publisher, USA.

Practical manual [Exercises to be downloaded every week from the unit’s website]
T K S Mukkur, N Gare, A Yap and Wetherall J D (2011) with contributions from Mr A Paxman and Dr B Brestovac. Molecular and Cellular Immunology 231

A selection of immunology texts may be placed in the Closed Reserve section of the library for reference use. Students are encouraged to become familiar with these texts initially by scanning the contents and then concentrating on the relevant and desired/sought -after information.

Web-based resources
The Unit Coordinator maintains a Web site for this unit use by the enrolled students. Most of the lecture and practicum materials will be available at this site one week ahead of the action time.

You may also find some of the information available through the School of Biomedical Sciences Home Page useful. From there, you can find out about the School of Biomedical Sciences, its courses and its staff. You may find the link to other Web sites particularly useful. The URL for the School of Biomedical Sciences Home Page at Curtin is: http://wbiomed.curtin.edu.au/

Contact Details
The unit coordinator for Molecular and Cellular Immunology 231 is Associate Professor Trilochan Mukkur [frequently referred to as “TK”] in the School of Biomedical Sciences at Curtin. During the semester you may need to contact Dr Mukkur for various reasons. He can be contacted in person or via email, phone or fax.

Office 308.208
Email: T.Mukkur@curtin.edu.au
Phone (08) 9266 7520 (office)
Fax (08) 9266 2342
Dr Mukkur’s will only be contactable for appointments via email at the above-mentioned address.

**Study Load**

You will need to spend about 6 hours a week outside of scheduled classes writing answers to the questions relating to the practical sessions and studying in this unit to be successful. It is important that you keep up with program as it is very difficult to catch up on lost or wasted time. You may need more time per week if you haven't acquired a strong background after undertaking Medical Laboratory Science 132 and/or if you have not studied in the field of biomedical sciences before.

Remember that the Unit Coordinator is there as a resource to assist you in your studies.

**Delivery of Unit**

**Tuition pattern**

Five (5) hours per week allocated as follows:

- **Lecture** 2 x 1 hour
- **Practical** 1 x 2 hours
  
  1 X 1 hour: Follow up Practicum Session

**Lectures**

Attendance at all lectures is **strongly** recommended.

**Practicals**

Attendance at practical sessions is compulsory. A laboratory coat (supplied by the School) must be worn in all laboratory sessions and left in the laboratory on completion of the session. Required safety regulations must be observed at all times (refer separate Safety Manual).

**IMPORTANT NOTE**

During this semester you may be working with pooled specimens either from hospital patients or pooled student serum or your own serum samples and reagents prepared from blood, blood products of body fluids. These materials may be capable of transmitting disease, particularly hepatitis and AIDS. For this reason, all specimens and reagents must be handled as if they were infectious. It is assumed that you were vaccinated against Hepatitis B and Mantoux tested recently. You will need to fill in your vaccination history against tetanus (in the first week when no actual practical session is planned to be carried out since some of the practical exercises will involve the use of tetanus toxoid as an antigen.

**Method of Assessment**

To pass this unit you must complete the assessment tasks listed below. Fill in your mark for each component as you receive it to keep track of your progress.

<table>
<thead>
<tr>
<th>Assessment Tasks</th>
<th>Applies to</th>
<th>Due Date</th>
<th>Worth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practical Test</td>
<td>Practicals</td>
<td>May 26</td>
<td>30%</td>
</tr>
<tr>
<td>Practical Notebook Handover</td>
<td>Practicals</td>
<td>May 27</td>
<td>5%</td>
</tr>
<tr>
<td>Midterm Test</td>
<td>Theory</td>
<td>April 11</td>
<td>15%</td>
</tr>
<tr>
<td>Final Theory Examination</td>
<td>Lectures</td>
<td>Official Exam. Period</td>
<td>50%</td>
</tr>
</tbody>
</table>

**TOTAL** 100%
Students are expected to achieve a pass standard in each of the assessments to complete Molecular and Cellular Immunology 231. Note that a mark of 50% or more in both the theoretical and practical components of the unit is required in order to secure a pass. Failure in any one area may result in an overall failure in this unit regardless of the total marks accrued. That is, a pass in the practical component but failure in the theory component (or vice versa) may lead to a fail grade for the unit, even though the student's total mark may exceed 50%. Students whose performance in any assessment is unsatisfactory may fail the entire unit or be required to complete additional assessment(s) to a satisfactory standard.

In accordance with Curtin policy, students are advised that this unit is a **SIGNIFICANT UNIT** in which failure twice may lead to termination of a student's course.

**Assessment Details**

**Practical component**
The acquisition of knowledge gained in the practicums will be assessed by Practical Test [worth 30%] to be offered at the end of the practicum sessions. Date for this test will be announced later in the practicum sessions.

As a part of the practicum assessment, notebooks demonstrating the recording of the practicum data can be examined at any time during any practicum session and will be worth 5% of the total assessment for the unit.

**Midterm test**
This test is one [1] hour in duration and will be worth 15% of the total assessment marks for the unit. The subject matter for the midterm test will cover chapters as shown in the lecture schedule.

**Final examination**
The final theory examination will consists of a supervised 2 hour paper to be conducted during the official university examination period. This will be a closed book exam. No notes or books will be allowed into the examination room. The use of a calculator is permitted. Further details regarding the final examinations will be provided later in the semester.

**Due dates**
You should note the following dates regarding assignments, assessments and examinations:

- **Practical component**
  - May 26
- **Practicum Notebook**
  - May 27 [to be deposited with Aggie Yap]
- **Midterm Test**
  - April 11
- **Final Examination**
  - Within the official examination period

**Mobile Phones**
If you have a mobile, please ensure that it is **TURNED OFF** during lecture and practical sessions as a courtesy to both lectures and other students. Students who do not comply with this request can be asked to leave the class.

**Copyright Requirements**
As a student of Curtin you must be familiar with the requirements of the University's Copyright Procedures. Guidance is available to you at the following web page ([http://lisweb.curtin.edu.au/copyright/](http://lisweb.curtin.edu.au/copyright/)) under the heading Information for All Students. Curtin's Copyright Procedures can be found under the heading Related Curtin Policies and Procedures whilst the Copyright Act can be accessed from the Additional information heading at that web site should you wish to understand the source of the Procedures.
Failure to comply with the University's policies and procedures on Copyright and IT/IS use may include suspension or termination of enrolment, fines, withdrawal of privileges for use of the University's ICT
facilities and services and, depending on what is copied, stored or communicated, may also render you liable to prosecution in the courts.

**Plagiarism Policy** (as adopted by the School of Biomedical Sciences)

It is not acceptable to simply copy the words of other students or authors when completing the weekly exercises and assignments in this unit. This action constitutes plagiarism and is regarded as academic malpractice. The penalties for plagiarism can be severe and may include termination from your course of study. All direct quotes must be correctly attributed to the author and should be kept to a minimum. Also, you should include a list of references to acknowledge the source(s) of information used to produce any written work.

The School of Biomedical Sciences advises students that it will use screening software to check for plagiarism in submitted work suspected of containing plagiarised material and also for routine screening of text as deemed appropriate by the Head of School.

Useful examples and explanations of plagiarism may be seen at the following web site – These will help you in understanding the nature of this form of academic malpractice.

http://www.indiana.edu/~wts/wts/plagiarism.html

As a guide only, typical penalties which may be imposed by the School of Biomedical Sciences for some of the more common types of plagiarism (including collusion) are shown in the Table below. Please note that each case of academic malpractice is assessed individually, and that penalties actually imposed by the Head of School (or delgatee) may vary from the examples shown in the Table.

<table>
<thead>
<tr>
<th>Example</th>
<th>Degree of seriousness</th>
<th>Typical Penalty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students submitting very similar work (even as a result of legitimate cooperation)</td>
<td>Collusion Minor to Severe depending on context</td>
<td>Loss of marks for that question or assignment etc by both students</td>
</tr>
<tr>
<td>Not referencing input (factual statements, definitions etc) where students’ words are used</td>
<td>Minor to Intermediate</td>
<td>Loss of 5% of assessment entity for each instance</td>
</tr>
<tr>
<td>Not referencing input where plagiarised words are used</td>
<td>Depends on context, but may be serious</td>
<td>Loss of 50 – 100% of marks for that question or assignment as appropriate</td>
</tr>
<tr>
<td>Not acknowledging ideas or concepts of others (ie. stealing intellectual property)</td>
<td>Serious misconduct</td>
<td>Loss of marks plus an additional penalty which could entail failure of unit and/or possible termination from course depending on the circumstances</td>
</tr>
</tbody>
</table>

**Supplementary Examinations**

Supplementary examinations are awarded only at the discretion of the Board of Examiners. The aim of a supplementary examination is to allow the student or correct minor problems/deficiencies in the initial assessment and not to gain extra study time or correct major problems. The number of supplementary examinations awarded will be kept to a minimum for any one examination period and for this course of study.

**NB**  Supplementary examinations are not automatically awarded. The Board of Examiners will carefully review individual cases. No written application for supplementary examination will be considered.

Supplementary examinations, if awarded, will be indicated on the official Curtin Examination result statement posted to all students, and will also be listed on the School notice board 24 hours after the Board of Examiners meeting. It is your responsibility to check your status. Students should note that supplementary examinations for **units conducted in the School** will be held at times to be advised. A
student who does not sit for a scheduled supplementary examination has no claim to a further examination. If you are awarded a supplementary examination it is imperative that you confirm the time and venue for the exam.

**Deferred Assessment**

Deferment of an examination is not automatic. Students may be permitted by the relevant Board of Examiners to defer an examination or other assessment where circumstances outside their control have arisen. However, a student's overall performance may be taken into account in granting permission to defer an examination.

Applications for deferment on health grounds or as a result of extenuating circumstances must be submitted not later than seven (7) days after the end of the relevant examination period or assessment date during the semester. **Detailed** medical certificates should be attached to the application where appropriate.

The prescribed application form may be obtained either from Admission and Student Records, the Course Administrator or the First Year. Completed form must be submitted to the Course Administrator. This includes applications for deferred assessment for units in your course of study conducted by other Schools.
<table>
<thead>
<tr>
<th>CURTI N WEEK</th>
<th>DATE (2011)</th>
<th>LECTURE TOPIC</th>
<th>LECTURER</th>
<th>TEXTBOOK CHAPTERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>21-25 Feb</td>
<td>Orientation and Transition to Course</td>
<td>SBS</td>
<td>Separate schedule</td>
</tr>
<tr>
<td>1</td>
<td>28 Feb</td>
<td>Overview - Innate Immunity</td>
<td>TKM</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>7 March</td>
<td>- Innate Immunity (contd.) - Acquired immunity &amp; organs of lymphoid system - Immunogens/Antigens</td>
<td>TKM, TKM</td>
<td>2, 2, 3</td>
</tr>
<tr>
<td>3</td>
<td>14 March</td>
<td>- Antibody Structure - Antibody function - Antigen-antibody Reactions</td>
<td>TKM, TKM</td>
<td>4, 5</td>
</tr>
<tr>
<td>4</td>
<td>21 March</td>
<td>Introduction to monoclonal antibodies: Antibody-based &amp; Cell-based Immunoassays</td>
<td>BB</td>
<td>5, 5</td>
</tr>
<tr>
<td>5</td>
<td>28 March</td>
<td>Complement Pathways &amp; regulation I &amp; II</td>
<td>DC</td>
<td>13</td>
</tr>
<tr>
<td>6</td>
<td>4 April</td>
<td>- Biology of B lymphocytes - Biology of T lymphocytes</td>
<td>TKM, TKM</td>
<td>7, 9</td>
</tr>
<tr>
<td>6</td>
<td>11 April</td>
<td>MIDTERM TEST</td>
<td>TKM</td>
<td>Lecture material covered in the test: Weeks 1-4</td>
</tr>
<tr>
<td>7</td>
<td>18 April</td>
<td>- Genetic basis of antibody diversity</td>
<td>JDW</td>
<td>6</td>
</tr>
<tr>
<td>8</td>
<td>22-29 April</td>
<td>TUITION-FREE WEEK (INCLUDING EASTER)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>2 May</td>
<td>- MHC &amp; Antigen Presentation Pathways</td>
<td>BB</td>
<td>8, 18</td>
</tr>
<tr>
<td>10</td>
<td>9 May</td>
<td>- T &amp; B Cell activation - Cytokines in IR</td>
<td>DN, DN</td>
<td>10, 11</td>
</tr>
<tr>
<td>11</td>
<td>16 May</td>
<td>Consequences of Immunological Tolerance breakdown: - Hypersensitivities - Introduction to the concept of autoimmune disease:</td>
<td>TKM</td>
<td>12 (select aspects from 15, 16)</td>
</tr>
<tr>
<td>12</td>
<td>23 May</td>
<td>Immunology of Infectious Diseases Final Examination Format</td>
<td>TKM</td>
<td>20</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>30 MAY-3 JUNE</th>
<th>STUDY WEEK</th>
</tr>
</thead>
</table>

| 6-17 June | EXAM PERIOD | 75% of the questions from Weeks 5-12. |
### MOLECULAR & CELLULAR IMMUNOLOGY 231 – Unit No. 311421
#### SEMESTER 1 – 2011

**PRACTICAL SCHEDULE**

<table>
<thead>
<tr>
<th>Week (Curtin No.)</th>
<th>Practicum Session No.</th>
<th>Date (2010)</th>
<th>PRACTICAL TOPIC</th>
<th>LECTURER</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 week</td>
<td></td>
<td></td>
<td><strong>-Orientation and Transition to Course</strong>&lt;br&gt;-Laboratory Manual information</td>
<td>SBS</td>
<td>Separate schedule</td>
</tr>
<tr>
<td>1</td>
<td>3-4 March</td>
<td></td>
<td>NO LABORATORY SESSION BUT OPEN FOR BLOOD SAMPLE DONATIONS FOR PRACTICUMS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>3,4 March</td>
<td>-Student blood sampling [20-80 ml]&lt;br&gt;-Separation of serum from blood samples&lt;br&gt;-Blood smears stained by Giemsa stain</td>
<td>TKM</td>
<td>A Yap to organize A Yap A Yap</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>10,11 March</td>
<td>-Fractionation of human serum</td>
<td>TKM</td>
<td>Students</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>17,18 March</td>
<td>-Estimation of protein content of serum protein fractions</td>
<td>TKM</td>
<td>Students</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>24,25 March</td>
<td>Nature of prepared fractions&lt;br&gt;- Ouchterlony immunodiffusion</td>
<td>TKM</td>
<td>Students Students</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>March 31- April 1</td>
<td>-Immunoelectrophoresis&lt;br&gt;-Indirect enzyme-linked immunosorbent assay [ELISA]: Step I: Coating with antigen Step II: Washing &amp; blocking unoccupied sites</td>
<td>TKSM</td>
<td>-Students -A Yap -A Yap</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>7,8 April</td>
<td>-ELISA (contd.): Step III: Washing &amp; adding dilutions of test sera; incubating for 60 minutes at 37°C Step IV: Washing &amp; addition of enzyme-linked secondary antibodies [goat anti-human IgG-AP conjugate sera]</td>
<td>TKSM</td>
<td>Students -A Yap</td>
</tr>
<tr>
<td>7</td>
<td>6</td>
<td>14, 15 April</td>
<td>Step V: Adding substrate, reading plates and plotting data</td>
<td>TKM</td>
<td>Students</td>
</tr>
<tr>
<td>8</td>
<td>7</td>
<td>21 April</td>
<td>-No Hands-on Practicum Session&lt;br&gt;-Student Consultation Sessions on ELISA Data Calculations</td>
<td>TKM</td>
<td>Students</td>
</tr>
<tr>
<td>8-9</td>
<td>22 – 29 April</td>
<td></td>
<td>TUITION-FREE WEEK [INCLUDING EASTER]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>No.</td>
<td>5, 6 May</td>
<td>Event Description</td>
<td>Instructor</td>
<td>Students</td>
</tr>
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</tr>
<tr>
<td>10</td>
<td>7</td>
<td>5, 6 May</td>
<td>Lymphocyte Separation</td>
<td>BB</td>
<td>Students</td>
</tr>
<tr>
<td>11</td>
<td>8</td>
<td>12, 13 May</td>
<td>-Western Blotting (SDS-PAGE &amp; immunostaining)</td>
<td>AP</td>
<td>Students</td>
</tr>
<tr>
<td>12</td>
<td>9</td>
<td>19, 20 May</td>
<td>Revision &amp; Practicum Test Format</td>
<td>TKM</td>
<td>Students</td>
</tr>
</tbody>
</table>

26 May -PRACTICUM TEST [1\textsuperscript{3/4} HOURS]

27 MAY -HAND IN PRACTICUM NOTEBOOKS

A Yap: Agnes, BB: Brian; AP: Adrian; TKM: TK