

**Medical Microbiology 235
UNIT OUTLINE - SEMESTER 1, 2012**

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Credit Value	25
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Please read this outline fully before commencing your study in this unit.

AIMS

Today, employers seek university graduates capable of working independently, who can plan and organise their workload to achieve pre-determined goals. Abilities to retrieve, analyse and evaluate information, well-developed problem solving, decision-making skills and to work as part of a team are seen as highly desirable qualities. All university graduates are expected to have effective written, verbal and interpersonal communication skills.

This unit will provide you with an opportunity to develop both as an independent learner and as part of a team with other students and your unit coordinator.

UNIT LEARNING OUTCOMES

Upon successful completion of this unit students will be able to:

- Demonstrate technical skills for the examination, cultivation and manipulation of microbial cultures with a clear understanding of the safety rules of a PC2 laboratory.
- Perform, record and interpret laboratory exercises in medical microbiology including principles of processing clinical specimens, identification of microbial pathogens, antimicrobial sensitivity testing, transfer of genetic information among bacteria and virulence properties of microbial pathogens.
- Relate knowledge of bacterial and viral replication, structure and function with their role in microbial pathogenesis and as targets for antimicrobial agents.
- Discuss bacterial and viral pathogenesis in the context of host parasite relationships.
- Demonstrate an understanding of the epidemiology and control of microbial infectious diseases.
- Outline and understand the steps involved in analysing clinical specimens for the presence of microbial pathogens.
- Discuss evolution of microbial resistance to antimicrobial drugs and its implications for future treatment of infectious diseases.

SYLLABUS

Medical Microbiology 235 covers the following topics:

- Prokaryotic cell structure and its significance in understanding virulence properties of pathogens and action of antibacterial drugs.
- Taxonomic principles and their application to medically important microbes.
- Basic introduction to host defence mechanisms against microbial pathogens.
- Principles and examples of virus and bacterial pathogenesis.

- Introduction to clinical microbiology and the principles of analysing human specimens for bacterial pathogens.
- Introduction to epidemiology and public health microbiology.
- Antibiotics and their mode of action.
- Antibiotic resistance mechanisms and the evolution of resistant microbes.

UNIT COORDINATOR & LECTURERS

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UNIT MATERIALS

All texts are available from the Curtin University Bookshop and a selection of texts has been placed in the Reserve section of the library.

Textbook

- Willey, Sherwood and Woolverton (2011) *Prescott's Microbiology*. 8th edition. McGraw Hill. Boston. (Recommended for Molecular Biotechnology students).
- Engelkirk, and Duben-Engelkirk 2008. *Laboratory Diagnosis of Infectious Diseases – essentials of Diagnostic Microbiology*. Lippincott Williams and Wilkins, Philadelphia. (Recommended for Laboratory Medicine students).

References

General references for information on basic microbiology.

- Madigan and Martinko (2006). Brock *Biology of Microorganisms*. 11th edition. NLM Jersey, Prentice Hall
- Forbes, B.A., Sahn, D.F and Weissfeld, A.S. (2007). Bailey and Scott's Diagnostic Microbiology, 12th ed., Missouri, Mosby Inc.

Laboratory Manual

It is highly recommended that you obtain a copy of the practical manual. This can be purchased from the Curtin University Bookshop and will also be available on FLECS-Blackboard.

Web-Based Resources

FLECS-Blackboard is Curtin University's electronic learning infrastructure. Unit materials and resources are available from this unit's FLECS-Blackboard site. The online unit site is designed to be a significant component of the unit and it is

essential that students access it. It is a requirement for students to have full internet and web access. FLECS-Blackboard is accessed via OASIS using the “my studies” tab.

You may also find some useful information at the Home Page for the School of Biomedical Sciences. The URL for the School of Biomedical Sciences Home Page at Curtin is:

<http://www.biomed.curtin.edu.au/>

UNIT DELIVERY

STUDY PROGRAM

LECTURES (L): Thursday 8-10 AM 201.322

PRACTICALS (P): A: Tuesday 9 AM-12 PM 308. 261
 B: Tuesday 12 PM- 3PM 308. 261
 C: Tuesday 3 PM- 6 PM 308. 261
 D: Wednesday 9 AM-12 AM 308.261
 E: Wednesday 2 PM-5 PM 308.261

Attend only one laboratory session

Week	Lecture	Topic	Lecturer	Practical
1.	1, 2	Prokaryotic cell structure and function	EW	Revision
2.	3 4	Host-parasite relationships Bacterial pathogenesis	DT DT	Revision Virulence factors
3.	5, 6	Bacterial pathogenesis	DT	Virulence factors
4.	7, 8	Clinical microbiology	PC	Virulence factors Clinical specimens
5.	9, 10	Clinical microbiology	PC	Clinical specimens eTest review
6.	11, 12	Clinical Bacteriology	PC	Clinical specimens
7.	Teaching free- no lecture, no lab			
8.	13, 14	Clinical Bacteriology	PC	Clinical specimens
9.	15, 16	Microbial taxonomy Antibacterial drugs	EW EW	No lab due to ANZAC day public holiday
10.	17, 18	Antibacterial drug resistance	DT	Antimicrobial resistance transfer eTest review
11.	19, 20	Viral structure, classification and replication Viral pathogenesis and infection cycles	BB	Antimicrobial resistance transfer Viral cultures
12.	21, 22	Epidemiology and control of infectious diseases	EW	Antimicrobial resistance transfer Viral cultures
13.		No lecture		Practical Exam

Lectures

Lecture	Topic	Lecturer
1, 2	Prokaryotic cell structure and function	EW
3	Host-parasite relationships: <ul style="list-style-type: none"> • Symbiotic relationships – mutualism, commensalism, parasitism • Virulence and pathogenicity • Normal flora 	DT
4-6	Bacterial pathogenesis: <ul style="list-style-type: none"> • Attachment and colonisation • Invasion and multiplication • Toxins • Host-parasite interactions 	DT
7-10	Clinical microbiology: <ul style="list-style-type: none"> • Collection and transport of clinical specimens • Laboratory processing of specimens, microscopy, use of selective and differential media Identification schemes	PC
11-14	Clinical Bacteriology <ul style="list-style-type: none"> • Gram-positive cocci • Enteric Gram-negative bacilli 	PC
15	Microbial taxonomy: <ul style="list-style-type: none"> • Taxons and taxonomic schemes • Nomenclature • Identification schemes 	EW
16	Antibacterial drugs: <ul style="list-style-type: none"> • Selective toxicity • Range of antibacterial drugs • Mode of action and target sites 	EW
17, 18	Antibacterial drug resistance: <ul style="list-style-type: none"> • Mechanisms • Resistance genes and associated genetic elements • Resistance transfer mechanisms • Evolution of multi-drug resistance 	DT
19	Viral structure, classification and replication <ul style="list-style-type: none"> • DNA viruses • RNA viruses 	BB
20	Viral pathogenesis and infection cycles <ul style="list-style-type: none"> • Transmission and vectors • Adsorption and tissue tropism • Penetration and replication • Cytopathic effects 	BB

21, 22	Epidemiology and control of infectious diseases: <ul style="list-style-type: none"> • Terminology • Monitoring and measurement, public health regulations • Disease cycle • Transmission • Emerging infectious diseases • Control – sanitation, vaccination 	EW
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Practicals

Week	Exercise	Skills/components
1, 2	Revision and safety rules	Safety rules for PC2 laboratory Gram stain and oil immersion microscopy Subculturing and plating for single colonies
2, 3, 4	Virulence factors	Detection of hemolysins Microscopic examination of bacterial capsules Demonstration of bacterial fimbriae Nagler reaction for detection of tetanus toxin Strep CHO groups
4, 5, 6, 8	Processing clinical specimens	Gram stain and specimen evaluation Inoculation of culture media for isolation of bacterial pathogens Cowan and Steel's tables Primary tests for identification of pathogens Gram stains of single colonies Confirmatory tests for identification of pathogens Antibiotic sensitivity testing; MIC and disk diffusion
10, 11, 12	Antimicrobial resistance transfer	Preparation of selective media Titration of conjugative culture for donor, recipient and transconjugant cells
11, 12	Virus cultures Serological and molecular typing	Demonstration of tissue culture and CPE of viruses Bacteriophage titration Kaufmann and White serological identification of <i>Salmonella</i> Phage typing of <i>Staphylococcus aureus</i>
13	Practical exam	

Attendance at practical sessions is highly recommended. If you are unable to attend due to extenuating circumstances, please inform your demonstrator as a courtesy.

It is expected that you will gain further skills and confidence in safely manipulating microbes and build on the practical experience gained in previous units. You are required to abide by the safety rules that will be provided in the first laboratory session.

Please limit the personal belongings you bring to the laboratory. You will require a fine point marker, pen or pencil to record results and your laboratory manual. The School will provide a laboratory gown.

STUDY LOAD

You will need to spend at least 5 hours a week outside of scheduled classes studying in this unit to be successful. Keeping up with the work is the key to being successful.

UNIT ASSESSMENT

ASSESSMENT SCHEDULE

Assessment Task	Worth
eTest 1	20%
eTest 2	20%
Final theory exam	20%
Practical exam	40%
TOTAL	100%

Practical Assessment

A practical exam will be held at the completion of the practical program in the last week of semester (day and time to be announced). The exam is in the form of a series of spot tests. There will be a total of seven spots. Six spots will consist of materials already observed or manipulated during the semester. The student may be asked to record, interpret and answer short questions related to this material. A further spot will enable assessment of the understanding and application of laboratory safety rules, practical skills and mastery of microbiological equipment. Students will be given seven minutes to complete each spot and then asked to move to the next spot. 40% of the marks will be allocated to this exam. This is an open book exam and students will be required to bring their practical manuals.

Theory Assessments

There will be three theory tests during the semester based on lecture content.

- **Invigilated eTests:**

Invigilated eTest 1. This will be held in week 4 (starting 19th March 2012) in the CAA laboratory. The material covered in the lectures held in weeks 1-3 will be assessed.

Invigilated eTest 2. This will be held in week 9 (starting 23rd April 2012) in the CAA laboratory. The material covered in the lectures held in weeks 4-8 will be assessed.

These are closed book assessments

- **Final theory assessment**

This exam will be given during the exam week and will have the format of a 1.0 hr short answer test. The material covered in the lectures held in weeks 9-12 will be assessed.

It will be closed book assessment..

IMPORTANT INFORMATION FOR USING THE COMPUTER ASSISTED ASSESSMENT (CAA) LABORATORY.

- Physical Location – Robertson (main) library level 5 (105:510)
- CAA Lab Home page – <http://is.curtin.edu.au/eot/caa> Student guidelines, CAA lab opening hours and a WebCT link are available from this page.
- Students must make an electronic booking for each test they sit in the CAA laboratory using the CAA lab online booking system. This is done via WebCT which can be accessed via OASIS (select “My Studies” and then WebCT under Useful Links) or via <http://webct.curtin.edu.au> Students use their student number and OASIS password. Be careful as the system is case specific, that is, a password “RFDT” is not the same as “rfdt”. After logging into WebCT students will see an icon labelled “CAA Lab online booking system” on the right hand side of their WebCT screen All tests times can be booked from the start of semester and more options are available the earlier a student books. Fridays are always busy and these time slots fill first.
- Students are able to reschedule or delete their booking prior to the time they have booked to sit the test. If the booking is not rescheduled or cancelled prior to the booked time the system will count the student as having sat the test and will not allow a new test time to be booked. Students need to contact staff in the CAA laboratory if this happens. However, they need to be aware that staff will cancel the students booking at the end of the day and the student is then required to rebook.
- CAA Laboratory phone – 9266 7438

Frequently asked questions:

1. Where do I find information about opening times and what I need for a test?

Answer: The CAA Laboratory has a Web page that contains useful information:

<http://is.curtin.edu.au/eot/caa/index.html>

2. What do I do if I have a problem with a test?

Answer: If you have a problem with a test or a question on a test ask staff in the CAA laboratory for a Report Sheet. This sheet will be sent to your Lecturer and you will then need to make an appointment with the Lecturer to discuss the problem.

3. Should I save my answer after each question?

Answer: Saving answers after each question is very important.

In the case of network problems work that is saved will be able to be recovered.

If your test is set to disallow answer submission after the test time is up any answer not saved will be disallowed. Hence a student may have done 10 questions but no work will be allowed.

4. Can saving the answer after each question disadvantage the student?

Answer: NO. The student is still able to change any answers before the test is submitted for grading. The process for this is to select the new answer and use “save answer” again.

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 to correct minor problems/ deficiencies in the initial assessment and not to gain extra study time or correct major problems.

NOTE: Supplementary examinations are not automatically awarded. The Board of Examiners will carefully review individual cases. No application by a student for supplementary examination(s) will be considered.

Supplementary examinations, if awarded, will be indicated on the official Curtin University examination result statement posted to all students. The lecturer concerned will also send you a letter regarding the details of the supplementary examination.

A student who does not sit for a scheduled supplementary examination has no claim to a further examination. Please ensure that you are available during the proposed date should you fail the unit.

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, and the validity of the documentary evidence provided, 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 or other appropriate certificates should be attached to the application. Please be aware that the unit coordinator may take steps to check the validity of medical certificates and other documents.

The prescribed application form may be obtained either from Admission and Student Records or the Course Administrator. Completed forms must be submitted to the Unit Coordinator and then to your Course Administrator. This includes applications for deferred assessment for units in your course of study conducted by other Schools.



IMPORTANT

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

All students must be available during the two examination weeks as scheduled in the Curtin Academic Calendar.

UNIVERSITY & SCHOOL POLICIES

STUDENTS RIGHTS AND RESPONSIBILITIES

It is the responsibility of every student to be aware of all relevant legislation and policies and procedures relating to their rights and responsibilities as a student. These include:

- the Student Charter
- the University's Guiding Ethical Principles
- the University's policy and statements on plagiarism and academic integrity
- copyright principles and responsibilities
- the University's policies on appropriate use of software and computer facilities

Information on all these things is available through the University's "Student Rights and Responsibilities" web page at: <http://students.curtin.edu.au/rights/>.

MOBILE PHONE

As a courtesy to both lecturer and other students, if you have a mobile phone, please ensure that it is TURNED OFF during lecture, tutorial, practical sessions and examination. Students who do not comply with this request can be asked to leave the class.

COPYRIGHT

As a student of Curtin you must be familiar with the requirements of the University's Copyright 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. Guidance is available to you at the following web page: <http://www.copyright.curtin.edu.au/>.

EVALUATE

eVALUate is Curtin's online system for gathering and reporting student feedback on their perceptions of the effectiveness of their learning experiences. eVALUate is only available online and has two survey instruments:

- **unit evaluation survey** (which asks students their perceptions of what helps and hinders their achievement of unit learning outcomes), and
- **teaching evaluation survey** (which asks students to give feedback to individual teachers on their teaching effectiveness).

You will be encouraged to critically review all aspects of this unit and the end of semester. Your feedback via the official communication channel message to eVALUate on OASIS will be greatly appreciated and will help to continually improve this unit. For further information please visit the website at www.evaluate.curtin.edu.au

PLAGARISM

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 plagiarism 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 that 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 delegate) may vary from the examples shown in the Table.

EXAMPLE	DEGREE OF SERIOUSNESS	TYPICAL PENALTY
Students submitting very similar work (even as a result of legitimate co-operation)	Collusion minor to severe depending on context	Loss of marks for that question or assignment etc by both students
Not referencing input (factual statements, definitions etc) where students' words are used	Minor to Intermediate	Loss of 5% of assessment entity for each instance
Not referencing input where plagiarised words are used	Depends on context, but may be serious	Loss of 50 – 100% of marks for that question or assignment as appropriate
Not acknowledging ideas or concepts of others (ie. stealing intellectual property)	Serious misconduct	Loss of marks plus an additional penalty which could entail failure of unit and/or possible termination from course depending on the circumstances