



Course Outline

Code: MBT353 Title: Microbial Pathogenesis

School of: Health & Sport Sciences
Teaching Session: Semester 2
Year: 2020
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Please go to the USC website for up to date information on the teaching sessions and campuses where this course is usually offered.

1. What is this course about?

1.1 Description

This course describes the basic concepts of bacterium-host relationships and explores virulence factors that promote colonisation and survival of infecting microorganisms and virulence attributes that damage the host. The course will also explore experimental approaches for investigating bacterium-host interrelationships, cultured cell lines and laboratory animals and their application in studying microbial pathogenicity. The course also explores challenges facing development of vaccines and discovering new antibiotics. The molecular pathogenesis of selected pathogens and the importance of normal microbiota and probiotics in health will also be discussed.

1.2 Course topics

The course discusses virulence properties of bacteria that are involved in colonisation and damaging the host and introduces experimental approaches for investigating bacterium-host relationship.

2. What level is this course?

300 level Graduate - Independent application of graduate knowledge and skills. Meets AQF and professional requirements. May require pre-requisites and developing level knowledge/skills. Normally taken in the 3rd or 4th year of an undergraduate program

3. What is the unit value of this course?

12 units

4. How does this course contribute to my learning?

Specific Learning Outcomes	Assessment Tasks	Graduate Qualities or Professional Standards mapping
On successful completion of this course you should be able to:	You will be assessed on the learning outcome in task/s:	Completing these tasks successfully will contribute to you becoming:
Identify the genetic diversity of bacteria, and experimental approaches used to study pathogenesis of bacteria and describe the virulence attributes of bacteria that are	Task 1a (Early quiz) and 1b (mid-semester exam)	Knowledgeable.

involved in colonisation and damaging the host, their mechanism of action and host defence.		
Analyse and evaluate experimental approaches used for assessing the pathogenicity of bacteria. Analyse and describe the mechanism of bacterium-host interaction using examples of journal articles in the areas of microbial pathogenesis as a guideline	Task 1b (mid-semester exam)	Creative and critical thinkers.
Describe challenges of developing efficient vaccines and discovering new antibiotics and their mechanism of actions. Describe how bacteria communicate with each other and with the host to cause infection and identify major mechanisms of pathogenicity of infectious diseases as well as how normal microflora work to protect colonisation of the body by pathogens	Task 3 (final exam)	Knowledgeable.
Identify and apply techniques that are used for identification and characterization of virulence attributes of pathogenic microorganisms	Task 2 (Practical lab exam)	Empowered.

5. Am I eligible to enrol in this course?

Refer to the [USC Glossary of terms](#) for definitions of “pre-requisites, co-requisites and anti-requisites”.

5.1 Enrolment restrictions

Nil

5.2 Pre-requisites

MBT263 or LFS261

5.3 Co-requisites

Nil

5.4 Anti-requisites

MEP351

5.5 Specific assumed prior knowledge and skills (where applicable)

General knowledge about the structure of bacteria, their growth mechanism as well as basic skills in cultivation and aseptic transfer of bacteria

6. How am I going to be assessed?

6.1 Grading scale

Standard – High Distinction (HD), Distinction (DN), Credit (CR), Pass (PS), Fail (FL)

6.2 Details of early feedback on progress

The course will include an early formative assessment on week four. The formative quiz will be based on materials covered during the first three lectures and discussed in detail in tutorial classes. Responses to early quiz will be peer reviewed to evaluate students' academic progress, including identifying the need for additional support.

6.3 Assessment tasks

Task No.	Assessment Tasks	Individual or Group	Weighting %	What is the duration / length?	When should I submit?	Where should I submit it?
1a	Early quiz	individual	0%	30 minutes	Week 4	Black board
1b	Mid-semester exam	Individual	30%	1 hour	Week 7	Online, Black board test tool
2	Practical exam	Individual	30%	2 hours	Week 10	Online, Black board test tool
3	Final exam	Individual	40%	2 hours	End of semester	Centrally scheduled on-line test
			100%			

Assessment Task 1a: Early quiz

Goal:	To assess your ability to identify the importance of bacterial genetic diversity and their ability to adapt to different hosts as well as the role of each virulence property of bacteria to interact with their host
Product:	Quiz
Format:	Multiple choice, online
Criteria:	Correctly identify how bacteria evolved their genetic diversity and how they were adapted to live in the body of warm-blooded animals Understand the importance of each virulence property of bacteria to colonize the host and survive the immune system

Assessment Task 1b: Mid-semester exam

Goal:	To assess your ability to describe virulence factors of bacteria that are involved in colonisation and damaging the host, as well as host defence and experimental approach to assess pathogenicity of bacteria
Product:	exam
Format:	Short answer questions-Online, Black board test tool
Criteria:	Correct description of virulence factors of bacteria and identifying which ones are involved in colonisation or damaging the host Accurate analysis of experimental approach used for assessing pathogenic properties of bacteria and description of challenges facing discovering new antibiotics and vaccines and their mode of actions

Assessment Task 2: Practical exam

Goal:	To assess your knowledge of the theory that underpins the practical procedures required for identifying and characterising virulence attributes of pathogenic microorganism .
Product:	Practical lab exam. Online, Black board test tool
Format:	This 2-hour assessment will be in the format of short answer
Criteria:	Evidence of applying microbiological knowledge to laboratory techniques that are commonly used for identification, and characterisation of virulence properties of pathogenic microorganisms

Assessment Task 3: Final Exam

Goal:	To assess your ability to describe virulence characteristics of pathogenic microorganisms and their mechanism of actions on host cells as well as describing current advances in developing vaccines and finally identifying mechanisms by which microflora protect the host against pathogens
Product:	Centrally scheduled online exam
Format:	The exam will be based on the materials covered in the course between weeks 7 and 13. This include lectures, lecture notes, literature reviews recommended by the guest lecturers, and sections of the prescribed text book indicated by the course coordinator.
Criteria:	Accurate description of the mechanisms that bacteria communicate with each other and the host, providing a concise description of the pathogenic mechanisms of common infectious diseases as well as the role of gut microbiota in protecting host. Correct description of the mechanisms by which antibiotics work and how pathogens circumvent them.

7. What are the course activities?

7.1 Directed study hours

The directed study hours listed here are a portion of the workload for this course. A 12-unit course will have total of 150 learning hours which will include directed study hours (including online if required), self-directed learning and completion of assessable tasks. Directed study hours may vary by location. Student workload is calculated at 12.5 learning hours per one unit.

This course will be delivered via technology-enabled learning and teaching. All lectures/workshops will remain in this mode for Semester 2 2020. When government guidelines allow, and if practical, students that elected on-campus study via the class selection process will be advised via Blackboard if/when on-campus sessions can resume.

Location:	Directed study hours for location:
USC Sunshine Coast	4 hours/week (i.e. 2 x 1 hour lectures, one hour tutorial and 1 hour practical/week*) ** IMPORTANT: See Blackboard for specific details about course delivery.

7.2 Course content

Week # / Module #	What key concepts/content will I learn?
W1	An introduction to Host-Parasite Interaction (History of bacteria and their genetic diversity)
W2	Host-Pathogen interactions (microbial pathogenesis)
W3	The first line of defence against bacterial invasion (Prevention and phagocytic cell response)
W4	Virulence factors that promote bacterial colonisation of the host and their survival
W5	Virulence factors that damages the host (bacterial toxins and their function)
W6	Vaccines and challenges ahead (The current vaccine situation and future direction)
W7	Mid-semester exam Antibiotics, discovery and the challenges of emerging resistant pathogens

W8	Human microbiota and their role in health and disease, with special reference to gut microbiota)
W9	Probiotics; a new era of biotherapy
W10	Bacterial secretion systems and their role in pathogenesis
W11	Quorum sensing in bacteria
W12	Mechanism of action of bacterial pathogens and diseases, 1-Group A and B streptococci and enterococci, and Bordetella pertussis
W13	Mechanism of action of bacterial pathogens and diseases: <i>Helicobacter pylori</i> and <i>Vibrio cholerae</i>

8. What resources do I need to undertake this course?

Please note that course information, including specific information of recommended readings, learning activities, resources, weekly readings, etc. are available on the course Blackboard site. Please log in as soon as possible.

8.1 Prescribed text(s)

Some chapters of the text book prescribed below is used as a foundation of microbial pathogenesis in conjunction with series of lecture notes, research articles, Literature reviews, guest lectures and educational videos as related to the objectives of the course:

Author	Year	Title	Publisher
Abigail A Salyers and Dixie D Whitt.	2002	Bacterial Pathogenesis, a molecular approach. 2nd edition.	ASM Press

8.2 Specific requirements

It is the responsibility of students to attend practical classes on time and have lab coat and proper clothing e.g. proper shoes. Students who do not have lab coat or proper shoes will not be allowed to enter the practical lab classes

9. Risk management

Students must read and take the online risk assessment test before starting practical classes and hand a print out of the successful risk assessment test to the course coordinator

It is your responsibility as a student to review course material, search online, discuss with lecturers and peers, and understand the health and safety risks associated with your specific course of study. It is also your responsibility to familiarise yourself with the University's general health and safety principles by reviewing the [online Health Safety and Wellbeing training module for students](#), and following the instructions of the University staff.

10. What administrative information is relevant to this course?

10.1 Assessment: Academic Integrity

Academic integrity is the ethical standard of university participation. It ensures that students graduate as a result of proving they are competent in their discipline. This is integral in maintaining the value of academic qualifications. Each industry has expectations and standards of the skills and knowledge within that discipline and these are reflected in assessment.

Academic integrity means that you do not engage in any activity that is considered to be academic fraud; including plagiarism, collusion or outsourcing any part of any assessment item to any other person. You are expected to be honest and ethical by completing all work yourself and indicating in your work which ideas and information were developed by you and which were taken from others. You cannot provide your assessment work to others. You are also expected to provide evidence of wide and critical reading, usually by using appropriate academic references.

In order to minimise incidents of academic fraud, this course may require that some of its assessment tasks, when submitted to Blackboard, are electronically checked through SafeAssign. This software allows for text comparisons to be made between your submitted assessment item and all other work that SafeAssign has access to.

10.2 Assessment: Additional requirements

Eligibility for Supplementary Assessment

Your eligibility for supplementary assessment in a course is dependent of the following conditions applying:

- a) The final mark is in the percentage range 47% to 49.4%
- b) The course is graded using the Standard Grading scale
- c) You have not failed an assessment task in the course due to academic misconduct

10.3 Assessment: Submission penalties

Late submission of assessment tasks will be penalised at the following maximum rate:

- 5% (of the assessment task's identified value) per day for the first two days from the date identified as the due date for the assessment task.
- 10% (of the assessment task's identified value) for the third day
- 20% (of the assessment task's identified value) for the fourth day and subsequent days up to and including seven days from the date identified as the due date for the assessment task.
- A result of zero is awarded for an assessment task submitted after seven days from the date identified as the due date for the assessment task.

Weekdays and weekends are included in the calculation of days late.

To request an extension, you must contact your Course Coordinator and supply the required documentation to negotiate an outcome.

10.4 Study help

In the first instance, you should contact your tutor, then the Course Coordinator. Additional assistance is provided to all students through Academic Skills Advisers. To book an appointment or find a drop-in session go to [Student Hub](#).

Contact Student Central for further assistance: +61 7 5430 2890 or studentcentral@usc.edu.au

10.5 Wellbeing Services

Student Wellbeing Support Staff are available to assist on a wide range of personal, academic, social and psychological matters to foster positive mental health and wellbeing for your success. Student Wellbeing is comprised of professionally qualified staff in counselling, health and disability Services.

Ability Advisers ensure equal access to all aspects of university life. If your studies are affected by a disability, mental health issue, learning disorder, injury or illness, or you are a primary carer for someone with a disability, [AccessAbility Services](#) can provide assistance, advocacy and reasonable academic adjustments.

To book an appointment with either service go to [Student Hub](#), email studentwellbeing@usc.edu.au or accessability@usc.edu.au or call 07 5430 1226

10.6 Links to relevant University policy and procedures

For more information on Academic Learning & Teaching categories including:

- Assessment: Courses and Coursework Programs
- Review of Assessment and Final Grades
- Supplementary Assessment
- Administration of Central Examinations
- Deferred Examinations
- Student Academic Misconduct
- Students with a Disability

Visit the USC website:

<http://www.usc.edu.au/explore/policies-and-procedures#academic-learning-and-teaching>

10.7 General Enquiries

In person:

- **USC Sunshine Coast** - Student Central, Ground Floor, Building C, 90 Sippy Downs Drive, Sippy Downs
- **USC Moreton Bay** – Service Centre, Ground Floor, Foundation Building, Gympie Road, Petrie
- **USC SouthBank** - Student Central, Building A4 (SW1), 52 Merivale Street, South Brisbane
- **USC Gympie** - Student Central, 71 Cartwright Road, Gympie
- **USC Fraser Coast** - Student Central, Student Central, Building A, 161 Old Maryborough Rd, Hervey Bay
- **USC Caboolture** - Student Central, Level 1 Building J, Cnr Manley and Tallon Street, Caboolture

Tel: +61 7 5430 2890

Email: studentcentral@usc.edu.au