



**UNSW**  
A U S T R A L I A

Science

BIOTECHNOLOGY & BIOMOLECULAR SCIENCES

BABS3081

**BACTERIA AND DISEASE**

Term 2, 2020



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## 1. Information about the Course

Year of Delivery	2020			
<u>Course Code</u>	BABS3081			
Course Name	Bacteria and Disease			
Academic Unit	Biotechnology & Biomolecular Science			
Level of Course	3 <sup>rd</sup> UG			
Units of Credit	6UOC			
Session(s) Offered	Term 2			
Assumed Knowledge, Prerequisites or Co-requisites	Prerequisite: MICR2011 Highly recommended: BABS3041 or BABS3641			
Hours per Week	7			
Number of Weeks	10			
Commencement Date	1 <sup>st</sup> June, 2020			
<b>Summary of Course Structure (for details see 'Course Schedule')</b>				
<b>Component</b>	<b>HPW</b>	<b>Time</b>	<b>Day</b>	<b>Location</b>
<i>e.g. Lectures</i>	3			
Lecture 1		11am-12 pm	Tuesday	online
Lecture 2		2-3pm	Tuesday	online
Lecture 3		10-11 am	Friday	online
Laboratory				
Lab – Component 1	4 hrs: Weeks 1 - 9	2-6pm	Thursday	online
Online				
Other activities, e.g., field trips				
<b>TOTAL</b>	7			

## 2. Staff Involved in the Course

Staff	Role	Name	Contact Details	Consultation Times
<b>Course Convenor</b> (please see note below)		Professor Ruiting Lan	Rm 3115 E26, Ph 9385 2095 r.lan@unsw.edu.au	By appointment
<b>Additional Teaching Staff</b>	Lecturers & Facilitators	Dr Jai Tree Dr Li Zhang	Rm 3113, E26, Ph 9385 9142. j.tree@unsw.edu.au Rm 4106, E26, Ph 9385 2042 l.zhang@unsw.edu.au	By appointment
	Tutors & Demonstrators	TBA	TBA	
	Technical Staff	Tim Nguyen, Tammy Tang		

### **3. Course Details**

#### **Course description**

Bacteria and Disease aims to provide students with a high level of understanding of the pathogenic mechanisms used by a diverse array of bacterial pathogens to cause human disease. In addition, the epidemiology and strategies used to control and prevent these infectious diseases will be discussed. The lecture program will include key pathogens infecting different body systems. In conjunction with the lecture program, the laboratory program will provide students with practical experience in contemporary medical microbiology techniques used for the diagnosis of bacterial infections. In addition, students will develop their research skills by conducting a research project on the isolation and characterisation of a common bacterial pathogen using conventional and molecular techniques.

#### **Course Learning Outcomes**

At the end of this course, students will be competent to:

1. Explain the pathogenic mechanisms used by common bacteria to cause disease and identify common pathogenic mechanisms used by these bacteria
2. Identify approaches that can be used to control the spread of disease as well as strategies that can be taken to prevent disease
3. Undertake the steps required to isolate, identify and report bacterial pathogens in a routine microbiology laboratory
4. Conduct research experiments, collect and analyse data and write a research report

<b>Course Learning Outcome (CLO)</b>	<b>LO Statement</b>	<b>Related Tasks &amp; Assessment</b>
CLO 1	Able to explain the pathogenic mechanisms used by common bacteria to cause disease and identify common pathogenic mechanisms used by these bacteria	Lectures and mid session and final exams
CLO 2	Able identify approaches that can be used to control the spread of disease as well as strategies that can be taken to prevent disease	Lectures and mid session and final exams
CLO 3	Able to undertake the steps required to isolate, identify and report bacterial pathogens in a routine microbiology laboratory	Prac program, lab tests, diagnostic reports
CLO 4	Able to conduct research experiments, collect and analyse data and write a research report	Research project and report

**Major Topics  
(Syllabus Outline)**

**Lecture/Tutorial Program**

For the organisms listed below students should be able to:

1. List major diseases caused.
2. Explain in detail the mechanisms of pathogenesis in the diseases you have listed above.
3. Understand the limitations of our knowledge and identify unsolved problems in our understanding of how bacteria cause disease.
4. Identify the experiments which you feel have contributed most to our understanding of the pathogenesis of the specific diseases you have listed above.

**Bacteria covered:**

*Staphylococcus aureus*

*Staphylococcus saprophyticus*

*Streptococcus pneumoniae*

*Mycobacterium tuberculosis*

*Vibrio cholerae*

*Clostridium botulinum*

*Clostridium perfringens*

*Bordetella pertussis*

*Neisseria meningitidis*

*Salmonella enterica*

*Staphylococcus epidermidis*

*Streptococcus pyogenes*

Viridans group of streptococci

*Mycobacterium avian-intracellulare complex*

*Pseudomonas aeruginosa*

*Clostridium tetani*

*Helicobacter pylori*

*Campylobacter concisus*

*Neisseria gonorrhoeae*

*Escherichia coli*

**Practical Program**

1. For the specimens listed below

- Wound swabs
- Rectal swabs

Students should be able to:

- a. Name the major pathogens that could be isolated from the specimen
  - b. Name normal flora commonly found in that specimen
  - c. Describe a protocol for culture and identification that would result in diagnosis of the most common bacterial infections.
  - d. Set up and examine
    - i. microscopic preparations
    - ii. bacterial culture plates
    - iii. tests for the identification of microorganisms and interpret the findings.
2. Describe the major distinguishing features of the bacteria demonstrated in kits 1-2.
  3. Given appropriate plates and tests, identify organisms in Kits 1-2.
  4. Characterisation of pathogenic *E. coli* from dog faecal samples



#### 4. Rationale and Strategies Underpinning the Course

##### Teaching Strategies

*The focus of this course is to understand the mechanisms by which bacteria colonise a host and subsequently cause disease. In constructing the themes of this course, the bacteria covered were specifically chosen to provide good examples of the range of pathogenic mechanisms used by bacteria to cause disease. For example, toxin production is an important and common mechanism by which bacteria cause disease, however the structure of the toxins involved, the mechanism by which they act and their site of action varies considerably among bacteria. The bacterial examples chosen for inclusion clearly demonstrate such differences but in addition demonstrate that in relation to toxin related disease, some bacteria have very similar mechanisms despite the fact they cause very different diseases. To encourage interactions between students and staff, questions are often posed in lectures. This approach not only reinforces understanding of the concepts being taught but also encourages discussion of the similarities/differences in the mechanisms used by bacteria discussed in previous lectures. To stimulate debate, discussion and to demonstrate that science is an evolving field areas of controversy in bacterial pathogenesis are introduced*

*The practical component of this course is designed to foster independent learning, research skill development, the development of critical thought and to stimulate both written and verbal communication. To facilitate this outcome each student is provided with simulated patient specimens and is required to identify the causative agent. This approach to practical teaching is challenging to students as they are required to conduct appropriate tests, interpret the results, diagnose their patients, infections and write a microbiological laboratory report. Students are also required to conduct a research project on the characterisation of a common bacterial pathogen from animal faecal samples using genome sequence and bioinformatics techniques. Through this real life mini-research project, student will develop research skills, scientific report writing skills, data analysis skills and a deeper understanding of human pathogens in the context of our environment.*

**5. Course Schedule****LECTURE TIMETABLE****Lecture Times and Locations:****Tuesday:** 11 am - 12 pm – Mathews C**Tuesday:** 2 pm – 3pm – CLB 2**Friday:** 10 am – 11 am – Mathews C

Please note all lectures will be online delivery

Week	Date	Time	Lecture	Lecturer
1	2/6/2020	11am-12pm	Course introduction	RL
	2/6/2020	2-3 pm	Bacterial Pathogenesis: overview	RL
	5/6/2020	10-11am	Streptococcal infection	RL
2	9/6/2020	11am-12pm	<i>Staph aureus</i> infection	RL
	9/6/2020	2-3 pm	Urinary pathogenic <i>Escherichia coli</i>	JT
	12/6/2020	10-11am	<i>E. coli</i> and gastrointestinal infection 1	JT
3	16/6/2020	11am-12pm	<i>E. coli</i> and gastrointestinal infection 2	JT
	16/6/2020	2-3 pm	<i>Shigella</i> and gastrointestinal infection	RL
	19/6/2020	10-11am	Mid-session exam advice	RL
4	23/6/2020	11am-12pm	<i>Salmonella</i> infections	RL
	23/6/2020	2-3 pm	<i>Campylobacter</i> and gastrointestinal infections	LZ
	26/6/2020	10-11am	<i>Vibrio cholerae</i>	RL
5	30/6/2020	11am-12pm	Anaerobic infections	JT
	30/6/2020	2-3 pm	<i>Neisseria meningitidis</i>	RL
	3/7/2020	10-11am	<i>Neisseria gonorrhoeae</i> and Chlamydia	RL
6	7/7/2020	11am-12pm	Flexi week	
	7/7/2020	2-3 pm	Flexi week	
	10/7/2020	10-11am	Flexi week	
7	14/7/2020	11am-12pm	<i>Pseudomonas aeruginosa</i> infections	RL
	14/7/2020	2-3 pm	Mycobacterial infection	RL
	17/7/2020	10-11am	<i>Helicobacter pylori</i> infection	LZ
8	21/7/2020	11am-12pm	Pneumonia caused by Gram-positive cocci	RL
	21/7/2020	2-3 pm	Current research – EHEC virulence	JT
	24/7/2020	10-11am	Current research - IBD	LZ
9	28/7/2020	11am-12pm	Current research - <i>Bordetella pertussis</i>	RL
	28/7/2020	2-3 pm	TBA	RL
	31/7/2020	10-11am	Revision and Final exam advice	RL

RL: Prof Ruiting Lan

JT: Dr Jai Tree

LZ: Dr Li Zhang

## LABORATORY PROGRAM

All lab classes will be held online synchronously on Thursday from 2 to 6 pm

Week	Date	Lab activity	Research project	Lab tests/ reports
1	4/06/2020	Kit 1 (Gram positive pathogens)		
2	11/06/2020	Kit 2 (Gram negative pathogens)		Lab test 1
3	18/06/2020	Diagnosis (Wound infections)		Lab test 2
4	25/06/2020	Diagnosis (Gastrointestinal tract infections)		Diagnostic reports due
5	2/07/2020	mid session exam	Project briefing	
6	9/07/2020	Flexi week	Flexi week	
7	16/07/2020		Identification and phylogroup typing	Lab test 3
8	23/07/2020		Resistance gene typing and virulence gene typing	
9	30/07/2020		analysis of tutor group data	
10	6/08/2020		Project report writing (no lab)	

## ASSESSMENT PROCEDURES

The assessment is divided into three components as listed below.

- **EXAMINATIONS**

**Mid-session examination (1 hour)**

Four short answer questions covering any part of the lecture program from week 1 up to and including week 3. **20%**

**End of session examination (2 hours)**

This will consist of eight short answer questions covering the material covered in lectures from weeks 4-9. **40%**

- **PRACTICAL ASSESSMENT\*** **40%**

The practical assessment is comprised of the following three components:

Part 1	Three lab tests (online open book tests)	<b>16%</b>
Part 2	Diagnostic reports (2 reports)	<b>4%</b>
Part 3	Project report	<b>20%</b>

\*Students who fail the practical assessment will fail the subject outright.

## 7. Additional Resources and Support

<b>Text Books</b>	Engleberg, N.C; V. DiRita and T.S. Dermody. Schaechter's Mechanisms of Microbial Disease, 5 <sup>th</sup> Edition Lippincott Williams & Wilkins, 2012 Availability: UNSW Bookshop, UNSW Library Open Reserve
<b>Course Manual</b>	<i>Available in print and on-line</i>
<b>Required Readings</b>	<i>More advanced reading on the topics covered in the lecture series can be obtained through pubmed. In addition specific journal articles will be recommended by individual lecturers.</i>
<b>Recommended Internet Sites</b>	<a href="http://www.cdc.gov/">http://www.cdc.gov/</a> <a href="http://www.asm.org/index.asp">http://www.asm.org/index.asp</a>
<b>Societies</b>	<i>Australian Society for Microbiology</i>
<b>Computer Laboratories or Study Spaces</b>	NA

## 8. Required Equipment, Training and Enabling Skills

<b>Equipment Required</b>	<i>Personal protection equipment (PPE) such as safety glasses, lab coat.</i>  <i>Please see following pages for full details of Risk assessments and laboratory rules and procedures.</i>
<b>Enabling Skills Training Required to Complete this Course</b>	<i>HS, ELISE, LILT</i>

## 9. Administration Matters

<b>Expectations of Students</b>	<b>MINIMUM REQUIREMENTS TO ACHIEVE A PASS IN BABS3081</b>  All students are required to achieve a satisfactory performance in all components of the subject.  Students who have achieved an aggregate mark of 50% or more overall, but only obtain a mark of 45% or less in the final theory examination or have an unsatisfactory performance in other components of the subject, may fail outright or be required to undertake further assessment.
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	<p>Where further assessment is required, unless there are special circumstances that need to be taken into consideration, the student will be awarded either a Pass or a Fail.</p> <p>Should further assessment be required it is the responsibility of the student to be available at the time and place notified. The supplementary examinations will be held in the dates as specified below. The time and place of the exams will be given via UNSW email by BSB student office.</p>
<b>Health and Safety</b>	<p><i>Information on relevant Health and Safety policies and expectations both at UNSW: <a href="https://safety.unsw.edu.au">https://safety.unsw.edu.au</a></i></p> <p><i>In addition please see details of risk assessments and laboratory procedures on pages 18-20.</i></p>
<b>Assessment Procedures</b>	<p><b>Students have been known to suffer a major crisis such as death or illness in the family or a major personal trauma during session. Please let your subject convenor or tutor know of any such events that may affect your performance in the subject as soon as possible, so that appropriate assistance can be rendered. If you are colour blind or have a specific disability, please advise the subject convenor at the beginning of session.</b></p>
<b>Special Consideration and Further Assessment</b>	<p>Students who believe that their performance, either during the session or in the end of session exams, may have been affected by illness or other circumstances may apply for special consideration. Applications can be made for compulsory class absences such as (laboratories and tutorials), in-session assessments tasks, and final examinations.</p> <p><b>Students must make a formal application for Special Consideration</b> for the course/s affected as soon as practicable after the problem occurs and <b>within three working days of the assessment to which it refers.</b></p> <p>Students should consult the “Special Consideration” section of Moodle for specific instructions related to each BABS course they are studying. Further general information on special consideration can also be found at <a href="https://student.unsw.edu.au/special-consideration">https://student.unsw.edu.au/special-consideration</a>.</p> <p><b>HOW TO APPLY FOR SPECIAL CONSIDERATION</b></p> <p>Applications must be made via Online Services in myUNSW. <b>You must obtain and attach Third Party documentation before submitting the application. Failure to do so will result in the application being rejected.</b> Log into myUNSW and go to <b>My Student Profile tab &gt; My Student Services channel &gt; Online Services &gt; Special Consideration.</b> After applying online, students must also verify supporting their documentation by submitting to <a href="#">UNSW Student Central</a>:</p> <ul style="list-style-type: none"> <li>• Originals or certified copies of your <a href="#">supporting documentation</a> (Student Central can certify your original documents), and</li> <li>• A completed <a href="#">Professional Authority form (pdf - download here)</a>.</li> </ul> <p>The supporting documentation must be submitted to Student Central for verification <b>within three working days</b> of the assessment or the period covered by the supporting documentation. Applications which are not verified will be rejected.</p> <p><b>Students will be contacted via the online special consideration system as to the outcome of their application. Students will be notified via their official university email once an outcome has been recorded.</b></p> <p><b>SUPPLEMENTARY EXAMINATIONS:</b></p> <p>The University does not give deferred examinations. However, further assessment exams may be given to those students who were absent from the final exams through illness or misadventure. Special</p>

	<p>Consideration applications for final examinations and in-session tests will only be considered after the final examination period when lists of students sitting supplementary exams/tests for each course are determined at School Assessment Review Group Meetings. Students will be notified via the online special consideration system as to the outcome of their application. <b>It is the responsibility of all students to regularly consult their official student email accounts and myUNSW in order to ascertain whether or not they have been granted further assessment.</b></p> <p style="text-align: center;"><b>Supplementary exam period for T2 2020: Mon 7 Sep 2020 – Fri 11 Sep 2020</b></p> <p><b>Further assessment exams will be offered on this day ONLY and failure to sit for the appropriate exam may result in an overall failure for the course. Further assessment will NOT be offered on any alternative dates.</b></p>		
<p><b>Diversity and Inclusion</b></p>	<p>The School of BABS is dedicated to creating a positive, inclusive educational environment that embraces diversity in all forms and rejects any form of hostile workplace, discrimination, or bullying. We have a clear statement of behavioural expectations (as well as definitions of discrimination, (sexual) harassment and bullying, which can be found here: <a href="https://student.unsw.edu.au/harassment">https://student.unsw.edu.au/harassment</a>. On this website, you can also find resources and contacts for reporting issues. In addition, the Science Equity, Diversity and Inclusion Working Group of the Faculty of Science have recently launched a set of Classroom Inclusivity Guidelines that all staff and students are striving to work under. They can be found here: <a href="https://www.science.unsw.edu.au/our-faculty/classroom-inclusivity-guidelines">https://www.science.unsw.edu.au/our-faculty/classroom-inclusivity-guidelines</a></p> <p>Beyond the University and Faculty protocols, it is my goal as course convenor to create a learning environment for my students that supports a diversity of thoughts, perspectives and experiences, and honors your identities (including race, gender, class, sexuality, religion, ability). To help accomplish this:</p> <ul style="list-style-type: none"> <li>- If you choose, please let me and the class know your chosen name and pronouns.</li> <li>- Your classmates and demonstrators (like many people) are still in the process of learning about diverse perspectives and identities. If something was said in class (by anyone) that made you feel uncomfortable, please talk to me about it.</li> <li>- As a participant in course discussions, you should also strive to honor the diversity of your classmates (e.g. make sure all voices are being heard, etc.).</li> <li>- If you feel like your performance in the class is being impacted by your experiences outside of class, please do not hesitate to contact me.</li> </ul> <p>Finally, the School recognises the added challenges faced by students during the coronavirus outbreak, in particular those related to teaching and learning remotely while public health is managed. Specific details on how this course will be managed are given throughout this manual and will be highlighted further in the first lecture, but please be assured I will strive to minimise stress to students while still endeavoring to deliver a high-quality teaching experience.</p>		
<p><a href="#">Grievance Policy</a><sup>2</sup></p>	<p><b>School Contact</b></p>	<p><b>University Contact</b></p>	

<sup>2</sup> UNSW Grievance Policy: <http://www.gs.unsw.edu.au/policy/documents/equitystatement.pdf>

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	Contact BSB Office G17, Tel: 9385 8047 babstudent@unsw.edu.au	University Counselling Services <sup>3</sup> Tel: 9385 5418	
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<sup>3</sup> Compass – University Counselling Service <https://my.unsw.edu.au/student/pvc/student-life-and-learning/counselling/UsingOurServices.html>



## 10. UNSW Academic Honesty and Plagiarism

### What is Plagiarism?

Plagiarism is the presentation of the thoughts or work of another as one's own.

\*Examples include:

- direct duplication of the thoughts or work of another, including by copying material, ideas or concepts from a book, article, report or other written document (whether published or unpublished), composition, artwork, design, drawing, circuitry, computer program or software, web site, Internet, other electronic resource, or another person's assignment without appropriate acknowledgement;
- paraphrasing another person's work with very minor changes keeping the meaning, form and/or progression of ideas of the original;
- piecing together sections of the work of others into a new whole;
- presenting an assessment item as independent work when it has been produced in whole or part in collusion with other people, for example, another student or a tutor; and
- claiming credit for a proportion a work contributed to a group assessment item that is greater than that actually contributed.†

For the purposes of this policy, submitting an assessment item that has already been submitted for academic credit elsewhere may be considered plagiarism.

Knowingly permitting your work to be copied by another student may also be considered to be plagiarism.

Note that an assessment item produced in oral, not written, form, or involving live presentation, may similarly contain plagiarised material.

The inclusion of the thoughts or work of another with attribution appropriate to the academic discipline does *not* amount to plagiarism.

The Learning Centre website is main repository for resources for staff and students on plagiarism and academic honesty. These resources can be located via:

[www.lc.unsw.edu.au/plagiarism](http://www.lc.unsw.edu.au/plagiarism)

The Learning Centre also provides substantial educational written materials, workshops, and tutorials to aid students, for example, in:

- correct referencing practices;
- paraphrasing, summarising, essay writing, and time management;
- appropriate use of, and attribution for, a range of materials including text, images, formulae and concepts.

Individual assistance is available on request from The Learning Centre.

Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting, and the proper referencing of sources in preparing all assessment items.

\* Based on that proposed to the University of Newcastle by the St James Ethics Centre. Used with kind permission from the University of Newcastle

† Adapted with kind permission from the University of Melbourne.