GENERAL COURSE INFORMATION

Implicit in this document is an agreement that you, the student, and we, the instructors, abide by the general principles laid out below.

Course objectives

The primary objective of this course is to introduce you to some key bacterial pathogens that cause disease in humans and animals, and explore the mechanisms by which these pathogens manage to survive in a hostile environment (our bodies) and cause disease and, perhaps, death.

Course description

This is a **learner-centered course** in **Pathogenic Bacteriology,** with online **and** interactive in-class elements. In the first part of the course we will take a close look at some prominent bacterial pathogens and the diseases they cause in humans and animals. Like characters in a play, bacteria have unique "personalities", and it is worth taking a look at them from this perspective. All pathogens, however, face a similar set of challenges when they set out to cause disease – they have to enter the body (human/animal/plant/amoeba), hang on to cell surfaces, or slip into cells, find food, and dodge highly efficient immune systems. In the second part of the course, we will explore the common strategies pathogens use to address these issues, and how this results in disease.

The laboratory course VSM/MIC 421b (Microbiological techniques) complements this course. You do **NOT** need to be signed up for 421b in order to attend this course.

INSTRUCTORS

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Please read the FAQ section to see if a question you have about the course has already been answered. If you do send a query that has been answered in the FAQ section, we will direct you to the appropriate section in the FAQ.

Location/time: All lectures will be released online (Panopto format). There will be no in-class lecture sessions. Discussion sessions will be held in **Room 101, Saguaro Hall 3.30 – 4.45 p.m.** on **Tuesdays or Thursdays** as indicated in the Syllabus**.**

Attendance

Attendance for the discussion sessions is mandatory. This class is learner-centered: active student participation is fully expected.

Course Materials: Relevant course materials and/or tasks will be available online on the course web site. Course materials, including the materials presented in class, will be released on a weekly basis as we progress through the course. You are expected to read and comprehend **all** materials posted in the Contents section of the D2L course site. Materials specific for graduate students taking MIC520 will be clearly marked on the D2L site. The main addition for graduate students will be in the discussion sessions – you will be assigned additional questions during this period.

Textbook: There are no 'required' textbooks for this class. This course is always a "work-in-progress": We routinely update course materials, and strive to include materials from the latest research in bacterial pathogenesis. If you are interested in a book on pathogenesis, I recommend: Bacterial Pathogenesis: a Molecular Approach, 3rd Edition by Wilson, Salyers, Whitt, & Winkler. The course is structured differently than the book, though the same general concepts are covered in both.

Course structure: The course is divided into 10 modules. Each module runs for three class periods, includeS 2 lectures + 1 discussion session. For Class 1 & Class 2 of all modules, you will perform prescribed tasks online, at your pace, within scheduled time limits. Class 3 of EVERY module is an in-class discussion session. Attendance is mandatory for all discussion sessions. Here is an example of a module:

Module 1	Date	Task	Points
Class 1	8/25/2015	Watch Lecture 1 online, Read assigned article(s)	
Class 2	8/27/2015	Watch Lecture 2 online, Read assigned article(s)	
Class 3	9/05/2015	IN-class discussion session. Attendance mandatory.	20 points
M1 Quiz		Take online within 60 hours **after** discussion session	20 points

GRADING: Grades for **MIC/IMB/VSC 420** are based on (a) Self-assessment quizzes and (b) Attendance and participation in discussion sessions (and submission of discussion reports). For information regarding **MIC/IMB/VSC 520**, see next page.

	Each module	Number of modules	**Total points**
Quiz	20 points	10	**200**
Discussion	20 points	10	**200**
Total Points			**400**

Bases on the final percentage, students will be assigned a letter grade using the following scale. Grades are not 'curved'.

GRADE	Percentage	Corresponding Points
A	> 90%	360-400
B	80-89.9%	320-359
C	70-79.9%	280-319
D	60-69.9%	240-279
E	< 60%	Below 239

Given the flexibility built into the course:

- **There will be no make-up quizzes or discussion sessions.**
- **There are no opportunities for extra points. None. At all.**
- **There will be no negotiations for grade changes. None. At all.**

If you miss a discussion session, you lose 20 points. *The only exception is if you have a medical or other emergency, or a UA-approved excuse such as jury duty, for which you are able to provide an official letter from your doctor or other official – in such a case an alternate assignment will be administered and graded.* If you fail to submit your quiz on time, you lose 20 points. Since quizzes are available online, there will be even less accommodation for not submitting them on time.

Grades for **MIC/IMB/VSC 520** are based on (a) Self-assessment quizzes, (b) Attendance and participation in discussion sessions (and submission of discussion reports) **and (c) an open book exam at the end of the semester**

	Each module	Number of modules	**Total points**
Quiz	20 points	10	**200**
Discussion	20 points	10	**200**
Exam	-	-	**50**
Total Points			**450**

Bases on the final percentage, students will be assigned a letter grade using the following scale. Grades are not 'curved'.

GRADE	Percentage	Corresponding Points
A	> 90%	405-450
B	80-89.9%	360-404
C	70-79.9%	315-359
D	60-69.9%	270-314
E	< 60%	Below 269

Academic integrity
Students are expected to adhere to the student code of academic integrity (http://www.dos.web.arizona.edu). Students caught engaging in academic dishonesty including, but not limited to, cheating, plagiarism, fabrication of data and modification of data will receive a failing grade on the assignment, and further sanctions as deemed appropriate by the instructor. If you have any questions about ethics, ask the instructor.

Special needs and disability accommodations
Any student who anticipates the need for reasonable accommodations to meet the requirements of this course should contact the Strategic Alternative Learning Techniques (SALT) Center or the Disability Resource Center. The appropriate office must document the need for accommodations. If there are any questions regarding this, please set up an appointment with the instructor.

Code of conduct / classroom behavior
All students in this class will be expected to abide by The Arizona Board of Regents' Student Code of Conduct. Additionally, students are asked to set their **phones to silent** and **remove their headphones.** Students will refrain from 'texting', 'tweeting' etc during class hours.

Confidentiality of student records
See: http://www.registrar.arizona.edu/ferpa/ferpa.htm

Subject to change
Other than the grade and attendance policies, this syllabus is subject to change, with advance notice.

MIC420 Syllabus, Fall 2015 (Last update: December 10th, 2015):
Note: This is only a template. While the overall course structure will likely not change, there WILL be changes to specific reading assignments & discussion topics}. For specific week-to-week updates, please refer to the D2L course site. D2L announcements override this document.

		Classes Start: 08-24-2015
MODULE 1		
Class 1	**Orientation**	**08-25-2015**
1. □ **Attend**: class for course orientation		
2. □ **Review:** (a) Course details (b) Syllabus		
3. □ **Watch Lecture:** Course overview: Bacterial Infectious diseases		
4. □ **Read**: Planet of the bacteria by Stephen Jay Gould. *An old classic.*		
Class 2	**Bacterial infections through the ages**	**08-27-2015**
1. □ **Watch Lecture:** Infectious diseases through the ages		
2. □ **Read:** Lowe **2008**: Causality & infections: Koch, Hill, & Crohn's. Lancet Infect Dis 8: 720–26		
Class 3	**Discussion: Helicobacter & Koch postulates**	**09-01-2015**
1. □ **Attend** discussion session & complete assigned tasks		20 points
2. □ **Complete**: Quiz 1 {Available 09/01/15 5 p.m. to 09/04/15 5 a.m.}		20 points
MODULE 2		
Class 4	**G+ cocci: *Staphylococcus***	**09-03-2015**
1. □ **Watch Lecture:** The genus *Staphylococcus*, virulence factors, disease.		
2. □ **Read**: McKenna M. Man Vs. MRSA. **2012**. Nature 482:23-25.		
3. □ **520 Read:** Lowy F.D. **2011**. NEJM 364(21):p1987)		
		Labor Day : 09-07-2015
Class 5	**G+ cocci: *Streptococcus***	**09-08-2015**
1. □ **Watch Lecture:** The genus *Streptococcus*, virulence factors, disease.		
2. □ **Read**: DuToit, **2014.** Pneumococci find a sugar daddy. Nat Revs Microbiol. 12(9):596		
3. □ **520 Read**: A key step towards a safer Strep Vaccine **2014**. (goo.gl/EZHTMN)		
Class 6	**Discussion: Smart strategies to target Staph virulence factors**	**09-10-2015**
1. □ **Attend** discussion session & complete assigned tasks		20 points
2. □ **Complete**: Quiz 2 {Available 09/10/15 5 p.m. to 9/13/15 5 a.m.}		20 points
MODULE 3		
Class 7	**G+ rods: *Bacillus***	**09-15-2015**
1. □ **Watch Lecture:** *Bacillus*, virulence factors, disease.		
2. □ **Read**: Anthrax susceptibility varies in human populations (Stanford **2012** http://goo.gl/EZHTMN)		
3. □ **520 Read**: Recruiting anthrax toxin to deliver cancer drugs (**2015**: http://goo.gl/fpiYcO)		
Class 8	**G+ rods: *Clostridia***	**09-17-2015**
1. □ **Watch Lecture:** The genus *Clostridia*, virulence factors, disease.		
2. □ **Read**: DeVrieze **2013**. The promise of poop. Science. 341(6149):954-7.		
3. □ **520 Read**: Rupnik **2015**. *C. difficile* bacteriotherapy. N Engl J Med. 16;372(16):1566-8.		
Class 9	**Discussion:** Gram-positive spore-forming rods, Nosocomial CDI	**09-22-2015**
1. □ **Attend** discussion session & complete assigned tasks		20 points
2. □ **Complete**: Quiz 3 {Available 9/22/15 5 p.m. to 9/25/15 5 a.m.}		20 points
MODULE 4		
Class 10	***Mycobacterium sp.***	**09-24-2015**
1. □ **Watch Lecture:** *Mycobacterium sp.*, virulence factors, disease		
2. □ **Read**: Humphries, **2013**. A sleeping giant. Nature 502:S14-S15		
3. □ **520 Read**: Gruber, **2015**. Delamanid Case study. Nat Medicine 21(2): 103		
Class 11	**Basic phylogenetics & bacterial diversification**	**09-29-2015**
1. □ **Watch Lecture:** Pathogen genome analysis 101		
2. □ **Read**: Gibbons **2013**. On the Trail of Ancient Killers. Science 340:1278		
3. □ **520 Read**: Jones **2014**. *Salmonella* Paratyphi Genome. Nat Rev Genet 15: 642		

Class 12	Discussion	10-01-2015
1.	□ **Attend** discussion session & complete assigned tasks	20 points
2.	□ **Complete**: Quiz 4 {Available 10/01/15 5 p.m. to 10/04/15 5 a.m.}	20 points
	MODULE 5	
Class 13	**Non-Enteric G- rods 2: *Pseudomonas & Legionellae***	**10-06-2015**
1.	□ **Watch Lecture:** *Psuedomonas sp. & Legionella sp.*: Virulence factors & disease.	
2.	□ **Read:** Cotter. **2011**. Molecular syringes scratch the surface. Nature 475:301	
3.	□ **520 Read**: Barnabie & Whiteley. **2015**. Iron & *P. aeruginosa* Vs. *S. aureus.* J Bact. 197 (14): 2250.	
Class 14	**Non-enteric G- cocci: *Neisseriae sp.***	**10-08-2015**
1.	□ **Watch Lecture:** The genus *Neisseria*, virulence factors, disease.	
2.	□ **Read**: Groopman J. Sex & the Superbug**. 2012**. New Yorker. http://goo.gl/kubQj9	
3.	□ **520 Read**: Yong E. **2014**. The long war against Iron Pirates. http://goo.gl/p7Rcme	
Class 15	**Discussion**	**10-13-2015**
1.	□ **Attend** discussion session & complete assigned tasks	20 points
2.	□ **Complete**: Quiz 5 {Available 10/13/15 5 p.m. to 10/16/15 5 a.m.}	20 points
	MODULE 6	
Class 16	**Enteric G- rods: *Escherichia coli pathotypes.***	**10-15-2015**
1.	□ **Watch Lecture:** *Escherichia coli pathotypes*, virulence factors, disease.	
2.	□ **Read:** Karch et al. **2012**. Lessons from 2011 O104 outbreak. Embo Mol Med 4:841-848.	
3.	□ **520 Read:** Callaway/Sheridan. **2015**. Smarter arrows in food safety quiver. PNAS. 112(40):12230	
Class 17	**Enteric G- rods (contd): *Salmonella & Yersinia***	**10-20-2015**
1.	□ **Watch Lecture:** *Salmonella & Yersinia*, virulence factors, disease.	
2.	□ **Read**: Harth. **2015**. In Africa, a deadly Salmonella strain takes hold. https://goo.gl/cm4N91	
Class 18	**Discussion**	**10-22-2015**
1.	□ **Attend** discussion session & complete assigned tasks	20 points
2.	□ **Complete**: Quiz 6 {Available 10/22/15 5 p.m. to 10/25/15 5 a.m.}	20 points
	MODULE 7	
Class 19	**Enteric Gram negatives: *Vibrio & Helicobacter***	**10-27-2015**
1.	□ **Watch Lecture:** *Vibrio & Helicobacter*, virulence factors, disease.	
2.	□ **Read**: McNeil Jr. **2015**. Promise is seen in inexpensive cholera vaccine. http://goo.gl/a2Tvw4	
3.	□ **520 Read:** Smuga-Otto. **2015**. *Helicobacter* activates stomach stem cells. https://goo.gl/o4q6p7	
Class 20	**Antibiotics & Antibiotic resistance**	**10-29-2015**
1.	□ **Watch Lecture:** Antibiotics & antibiotic resistance*:* mechanisms of action & resistance	
2.	□ **Read**: Wright GD. **2013**. Q&A: Antibiotic resistance. BMC Biology 11:51	
3.	□ **520 Read:** Kåhrström CT. **2013**. Mismatch excels when ampicillin runs low. Nat Revs Micro 11:	
Class 21	**Discussion**	**11-03-2015**
1.	□ **Attend** discussion session & complete assigned tasks	20 points
2.	□ **Complete**: Quiz 7 {Available 11/03/15 5 p.m. to 11/06/15 5 a.m.}	20 points
	MODULE 8	
Class 22	**Signal-sensing & Virulence gene expression**	**11-05-2015**
1.	□ **Watch Lecture:** Signal-sensing & Virulence gene expression	
2.	□ **Read:** Kennis 2007. *Brucella* light-sensing via two-component system	
3.	□ **520 Read:** Viswanathan 2013 *Shigella* RNA thermometer	
		Veteran's day:11-11-2015
Class 23	**Bacterial communities & Quorum-sensing**	**11-10-2015**
1.	□ **Watch Lecture:** Bacterial communities & Quorum-sensing	
2.	□ **Read**: Bassler B. 2009. How bacteria "talk". http://goo.gl/yzJXD8	
3.	□ **520 Read:** Viswanathan 2013. Pseudomonas QS & Taste	
Class 24	**Discussion**	**11-12-2015**
1.	□ **Attend** discussion session & complete assigned tasks	20 points
2.	□ **Complete**: Quiz 8 {Available 11/12/15 5 p.m. to 11/15/15 5 a.m.}	20 points

MODULE 9		
Class 25	**Bacterial secretion systems**	**11-17-2015**
1. □ **Watch Lecture:** Bacterial secretion systems 2. □ **Read:** Scott & Friel. 2013. Tit for tat – a bacterial counterattack system. Small things considered. 3. □ **520** Watch: Mekalanos on T6SS. https://www.youtube.com/watch?v=aQIU5CvsIjw		
Class 26	**Phages and bacteria virulence**	**11-19-2015**
1. □ **Watch Lecture:** Phages & Bacterial Virulence 2. □ **Read**: Youle & Schaechter. 2008. Small things considered: SaPI1 particles 3. □ **520 Read:** Youle. 2013. Small things considered: SaPI1 particles		
Class 27	**Discussion (TCE)**	**11-24-2015**
1. □ **Attend** discussion session & complete assigned tasks		20 points
2. □ **Complete**: Quiz 9 {Available 11/24/15 5 p.m. to 11/27/15 5 a.m.		20 points
Thanksgiving: No Classes		**11-26-2015**
MODULE 10		
Class 28	**Innate immunity & Inflammation**	**12-01-2015**
1. □ **Watch Lecture:** Innate immune responses to bacterial infections. 2. □ **Read**: Wilhelm. 2011. Tangled NETs of the immune system. Max Planck Research 3. □ **520 Read:** Viswanathan 2013. What tangled webs we weave. Gut Microbes 4:3, 179-180		
Class 29	**The human microbiome**	**12-03-2015**
1. □ **Watch Lecture:** Human microbiome and its role in health and disease 2. □ **Read**: Wallis. 2014. Bacteria & Obesity. Scientific American. 3. □ Optional Read: Scott. 2014. NYT. My No-soap, no-shampoo, bacteria-rich hygiene experiment		
Class 30	**Wrap-up discussion**	**12-08-2015**
1. □ **Attend** discussion session & complete assigned tasks		20 points
2. □ **Complete**: Quiz 10 {Available 12/08/15 5 p.m. to 12/11/15 5 a.m.}		20 points
READING DAY: No Classes		**12-10-2015**
FINAL EXAM		**None**