Cover Sheet: Request 14340

MCB 4XXX Antimicrobial Resistance (AMR)

Info

Process	Course|New|Ugrad/Pro
Status	Pending at PV - University Curriculum Committee (UCC)
Submitter	Daniel Czyz dczyz@ufl.edu
Created	10/14/2019 11:36:16 PM
Updated	12/10/2019 9:21:34 AM
Description of request	I have developed a new course on Antimicrobial Resistance that I teach to upper-undergraduate and graduate-level students in an asynchronous online format. The course concentrates on the basis of antimicrobial resistance in bacteria but also touches on mechanisms responsible for resistance in viruses, parasites, fungi, and cancer. It describes the mechanisms of resistance, transmission, diagnostics, and development of novel alternative treatment options. This course teaches students one of the most urgent global problems that now affect not only healthcare and agriculture but also the environment. Please consider this course for formal approval.

Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	CALS - Microbiology and Cell Science 514910000	Eric Triplett		10/28/2019
No document changes					
College	Approved	CALS - College of Agricultural and Life Sciences	Joel H Brendemuhl	Edits requested by the CALS CC have been addressed. The graduate submission is pending at the GCC (request # 14385).	12/10/2019
AMR_Co-listing_explanation.pdf AMR_Course_Syllabus_Undergraduate_CourseApproval.pdf AMR_Course_Syllabus_Graduate_CourseApproval.pdf					12/3/2019 12/9/2019 12/9/2019
University Curriculum Committee	Pending	PV - University Curriculum Committee (UCC)			12/10/2019
No document changes					
Statewide Course Numbering System					
No document changes					
Office of the Registrar					
No document changes					
Student Academic Support System					
No document changes					
Catalog					
No document changes					
College Notified					
No document changes					

Course|New for request 14340

Info

Request: MCB 4XXX Antimicrobial Resistance (AMR)
Description of request: I have developed a new course on Antimicrobial Resistance that I teach to upper-undergraduate and graduate-level students in an asynchronous online format. The course concentrates on the basis of antimicrobial resistance in bacteria but also touches on mechanisms responsible for resistance in viruses, parasites, fungi, and cancer. It describes the mechanisms of resistance, transmission, diagnostics, and development of novel alternative treatment options. This course teaches students one of the most urgent global problems that now affect not only healthcare and agriculture but also the environment. Please consider this course for formal approval.

Submitter: Casey Griffith cgriffith@aa.ufl.edu
Created: 1/16/2020 10:57:58 PM
Form version: 5

Responses

Recommended Prefix MCB
Course Level 4
Course Number XXX
Category of Instruction Joint (Ugrad/Grad)
Lab Code None
Course Title Antimicrobial Resistance Lab
Transcript Title AMR Lab
Degree Type Other
If other degree type, specify BS/MS
Delivery Method(s) Online, UF Online - Please attach a letter of support from the Director of the UF Online program
Co-Listing Yes
Co-Listing Explanation Undergraduate and Graduate students are required to complete 10 quizzes, each worth 10 points (100 pts total) and four exams (Exam I: 100 pts., Exam II: 200 pts., Exam III: 100 pts., Exam IV: 300 pts.). In addition to these assignments, graduate students are required to complete and turn in weekly written assignments (total of 13 assignments worth 130 pts.).
Effective Term Spring
Effective Year 2020
Rotating Topic? No
Repeatable Credit? No

Amount of Credit 3

S/U Only? No
Contact Type Regularly Scheduled
Weekly Contact Hours 3
Course Description This course covers content related to antimicrobial resistance: the origins of antimicrobial resistance, dissemination, mechanisms, therapeutics, and impact on healthcare, agriculture, and the environment. This course mainly concentrates on resistance in bacteria, but will also discuss other organisms, including viruses, parasites, fungi, and cancer.
Prerequisites MCB2000 or MCB3020 or MCB3023
Co-requisites N/A
Rationale and Placement in Curriculum Antibiotic resistance is a growing problem on a global scale. It is estimated that by 2050 annual deaths from antibiotic resistance will increase by 10 fold, reaching 10 million. One of the major contributors to this problem is the lack of awareness and education. The knowledge and problems addressed in the course prepare students for their future health-related careers. This course is also much needed not only at UF, but also at the national level. Finally, there is a high demand for this course to be broadly implemented into UF curriculum; here are some examples of what students say about this course:
-Great course that is needed!!! Hopefully it will be continued to be offered since all pre-health

professionals should be educated on this topic!
-I think this course should be a required class for microbio students
-I really enjoyed this course! While I didn't do AMAZING, I feel I learned more in this class than I did in any other courses this semester.
-This was by far one of my favorite courses in this program, highly informative and well put together.
-It is a lot of material! But again, because its so relevant to today, and because he taught with passion and even gave personal examples in relation to his life, it really didn't feel like it was too much, it felt more like "wow this is interesting, what steps can I take for myself, my friends, my family to prevent (blank) disease/ or prevent the enhancement of antibiotic resistance".
-I loved this course! Reading articles or watching videos about topics discussed was interesting and not always something you can do with certain classes. I enjoyed not having a textbook, as this topic is changing too rapidly for a text to keep up.
-I thoroughly enjoy this course, would recommend it to all future students, and can easily see this course becoming part of the core curriculum with being mandatory. The knowledge I've obtained is above and beyond my expectations with myself even using a large portion of this course as a focus for my graduation thesis paper.
-I really enjoyed this course and I wish I could enroll in a part 2. The information in this course is so applicable to real world situations and the information uncovered real issues which the world is facing right now and will face in the future
-I thought this course was one of the best out of the program.
-I absolutely loved this class! It has opened my eyes to the world of AMR and just how large scale these problems are today.
-I hope that this course will be available from here on out. The subject matter is relevant to all fields of medicine, lab, and epidemiology, as well as agriculture and animal husbandry. The more people who are educated about antimicrobial resistance the better.

Course Objectives After completion of this course, students should be able to:
- Outline problems associated with antimicrobial resistance across healthcare, agriculture, and the environment
- Explain resistance mechanisms in viruses, fungi, parasites, and cancer
- Identify major classes of antibiotics and their respective mechanisms of action
- Describe known mechanisms of antibiotic resistance and modes of transmission
- Identify means of detection/assessment of antibiotic resistance
- Describe therapeutic approaches used to fight antibiotic resistance
- Recognize scientific terms related to antimicrobial resistance
- Assess risks associated with antibiotic-resistant infections
- Employ online databases to utilize genomic, chemical, and epidemiological data on AMR

Course Textbook(s) and/or Other Assigned Reading Lecture 1 - Antibiotic Resistance Threats in the United States, CDC 2013
Lecture 2 - Reducing antimicrobial use in food animals, Van Boeckel et al. 2017
Lecture 3 - Antibiotic-resistance genes in waste water. Karkman et al. 2018
Lecture 4 - On the antibacterial action of cultures of a penicillium with special reference to their use in the isolation of B. influenzae, Fleming 1929
Lecture 5 - Heavy use of prophylactic antibiotics in aquaculture a growing problem for human and animal health and for the environment, Cabello 2006
Lecture 6 - Balancing water sustainability and public health goals in the face of growing concerns about antibiotic resistance. Pruden 2014
Lecture 7 - Bacterial Wall as Target for Attack - Past Present and Future Research. Koch 2003
Lecture 8 - Antimicrobial resistance in the next 30 years. Bassetti et al. 2017
Lecture 9 - Aureomycin - a product of the continuing search for new antibiotics, Duggar 1948
Lecture 10 - Antibiotics for Emerging Pathogens. Fischbach and Walsh 2009
Lecture 11 - Non-antibiotic treatments for bacterial diseases in an era of progressive antibiotic resistance. Opal 2016
Lecture 14 - The origins and molecular basis of antibiotic resistance. Hawkey 1998
Lecture 15 - Bacterial resistance to antibiotics - enzymatic degradation and modification. Wright 2005
Lecture 16 - The importance of Efflux pumps in bacterial antibiotic resistance. Webber and Piddock 2003
Lecture 17 - Bacterial resistance to antibiotics - modified target sites. Lambert 2005
Lecture 18 - Antibiotic resistance of bacteria in biofilms. Stewart and Costerton 2001
Lecture 19 - Bad bugs no drugs no ESKAPE. Boucher et al. 2009
Lecture 20 - Reduced glycopeptide susceptibility in methicillin-resistant S. aureus. Appelbaum 2007

Lecture 21 - Food and human gut as reservoirs of transferable antibiotic resistance encoding genes. Rolain 2013
Lecture 22 - The role of type VI secretion system effectors in target cell lysis and subsequent HGT. Ringel et al. 2017
Lecture 23 - Antibiotic resistance in prevalent bacterial and protozoan sexually transmitted infections. Krupp and Madhiyanan 2015
Lecture 26 - Antimicrobial susceptibility testing - a review of general principles and contemporary practices. Jorgensen and Ferraro 2009
Lecture 27 - Diagnosing Antimicrobial Resistance. Burnham et al. 2017
Lecture 28 - Platforms for Antibiotic Discovery. Lewis 2013
Lecture 29 - Host-directed antimicrobial drugs with broad-spectrum efficacy against intracellular bacterial pathogens. Czyz et al. 2014
Lecture 30 - Targeting host metabolism. Czyz et al. 2017
Lecture 31 - Revising Natural Products. Weiman 2015
Lecture 32 - Action Plan for Combating Antibiotic-resistance Bacteria, White House 2015
Lecture 35 - Antiviral Drug Resistance - Mechanism and Clinical Implications. Strasfeld and Chou 2010
Lecture 36 - Influenza Antiviral Drug Resistance _ CDC
Lecture 37 - Antifungal Agents - mechanisms of action. Odds et al. 2003
Lecture 38 - Antifungal Agents. Ghannoum and Rice 1999
Lecture 39 - Antiparasitic chemotherapy - from genomes to mechanisms. Horn and Duraisingh 2014
Lecture 40 - GM Crops. Bonny 2016
Lecture 41 - Cancer Drug Resistance. Mansoori et al. 2017

There is a list of additional reading material provided to students

Weekly Schedule of Topics Lectures:

1	Course Introduction; Antimicrobial Resistance in Healthcare
2	Antimicrobial Resistance in Agriculture
3	Antimicrobial Resistance in the Environment
4	Penicillin Discovery and Mechanism of Action
5	Antibiotics: Cell Wall Synthesis Inhibitors, Part I
6	Antibiotics: Cell Wall Synthesis Inhibitors, Part II
7	Antibiotics: Folate Synthesis Inhibitors
8	Antibiotics: Protein Synthesis Inhibitors, Part I
9	Antibiotics: Protein Synthesis Inhibitors, Part II
10	Antibiotics: Other Mechanisms of Action & the Future
11	Antibiotics: Toxicity and Side Effects
12	Lecture 1-11 Exam Review
13	No Lecture, Exam I covering lectures 1-11
14	Antibiotic Resistance: Overview
15	Antibiotic Resistance: Modification/Destruction of Antibioitics
16	Antibiotic Resistance: Efflux Pumps & Porins
17	Antibiotic Resistance: Target Modification
18	Antibiotic Resistance: Bacterial Biofilms
19	Multidrug Resistant Bacteria: No ESKAPE
20	Multidrug Resistant Bacteria: MRSA/VRSA
21	Antibiotic Resistance Reservoirs
22	Modes of Transmission
23	Antimicrobial Resistance in Sexually Transmitted Infections
24	Lecture 1-23 Exam Review
25	No Lecture, Exam II covering lectures 1-23
26	Antimicrobial Resistance Assessments, Part I
27	Antimicrobial Resistance Assessments, Part II
28	Therapeutics: Hunt for Novel Antibiotics
29	Therapeutics: Host-targeted Therapeutics, Part I

30 Therapeutics: Host-targeted Therapeutics, Part II
31 Therapeutics: Alternative Medicine
32 Prophylaxis and Control Measures
33 Lecture 24-32 Exam Review
34 No Lecture, Exam III covering lectures 24-32
35 Antimicrobial Resistance: Viral Infections, Part I
36 Antimicrobial Resistance: Viral Infections, Part II
37 Antimicrobial Resistance: Fungal Infections, Part I
38 Antimicrobial Resistance: Fungal Infections, Part II
39 Antimicrobial Resistance: Parasitic Infections, Part I
40 Pesticide Resistance: Genetically Modified Organisms
41 Drug Resistance in Cancer
42 Lectures 1-23 Final Exam Review
43 Lectures 24-43 Final Exam Review

Grading Scheme Undergraduate Students Graduate Students

Percentage Score range Percentage Score range
A >93.4

>654

A >93.4>775

A-	93.3-90.0	653-630	A-	93.3-90.0	774-747
B+	89.9-86.6	629-608	B+	89.9-86.6	746-719
B	86.5-83.4	607-584	B	86.5-83.4	718-692
B-	83.3-80.0	583-560	B-	83.3-80.0	691-664
C+	79.9-76.5	559-536	C+	79.9-76.5	663-635
C	76.4-73.3	535-513	C	76.4-73.3	634-608
C-	73.2-70.0	512-490	C-	73.2-70.0	607-581
D+	69.9-66.6	489-466	D+	69.9-66.6	580-553
D	66.5-63.3	465-443	D	66.5-63.3	552-525
D-	63.2-60.0	442-420	D-	63.2-60.0	524-498
E	<60.0 <420	E	<60.0	<498	

Points Percentage Points Percentage
Exam I

100 14 Exam I

100

12
Midterm

200 29 Midterm

200 24
Exam II

100 14 Exam II

100 12
Final Exam 300 43 Final Exam 300 36
Quizzes

100 14 Quizzes

100 12
Assignments 0

0

Assignments 130 16
Total

700 Total 830

Instructor(s) Dr. Daniel M. Czyz
Attendance & Make-up Yes
Accomodations Yes
UF Grading Policies for assigning Grade Points Yes
Course Evaluation Policy Yes

Antimicrobial Resistance: Co-listed Graduate and Undergraduate Course

Graduate students are required to complete 13 written weekly assignments. These assignments assess students' critical thinking, understanding of the literature, and assess their knowledge of the subject. These assignments are designed to develop graduate-level competencies, including deeper analysis, data mining, literature review, and research-based utilization of bioinformatics tools.

	Undergraduate Students	
	Percentage	Score range
A	>93.4	>654
A-	93.3-90.0	653-630
B+	89.9-86.6	629-608
B	86.5-83.4	607-584
B-	83.3-80.0	583-560
C+	79.9-76.5	559-536
C	76.4-73.3	535-513
C-	73.2-70.0	512-490
D+	69.9-66.6	489-466
D	66.5-63.3	465-443
D-	63.2-60.0	442-420
E	<60.0	<420

	Graduate Students	
	Percentage	Score range
A	>93.4	>775
A-	93.3-90.0	774-747
B+	89.9-86.6	746-719
B	86.5-83.4	718-692
B-	83.3-80.0	691-664
C+	79.9-76.5	663-635
C	76.4-73.3	634-608
C-	73.2-70.0	607-581
D+	69.9-66.6	580-553
D	66.5-63.3	552-525
D-	63.2-60.0	524-498
E	<60.0	<498

	Points	Percentage
Exam I	100	14
Midterm	200	29
Exam II	100	14
Final Exam	300	43
Quizzes	100	14
Assignments	0	0
Total	700	

	Points	Percentage
Exam I	100	12
Midterm	200	24
Exam II	100	12
Final Exam	300	36
Quizzes	100	12
Assignments	130	16
Total	830	

	Level	
Assignments	Undergraduate	Graduate
Exam I (lectures 1-11)	*100	*100
Exam II (lectures 1-23)	200	200
Exam III (lectures 23-32)	*100	*100
Exam IV (lectures (1-43)	300	300
Quizes, 10	100	100
Extra Credit Quiz, 1	10	10
Case Study Writing Assignment, 13	*not required*	130
Total	700	830

*students get to drop the lowest-score exam (either I or III).

NR: not required

There is a 15.7% grade difference between undergraduate and graduate students

Original file: AMR_Co-listing_explanation.pdf

MCB6XXX: Antimicrobial Resistance 3 credits

Course Description

UF Catalog: This course covers content related to antimicrobial resistance: the origins of antimicrobial resistance, dissemination, mechanisms, therapeutics, and impact on healthcare, agriculture, and the environment. This course mainly concentrates on resistance in bacteria, but will also discuss other organisms, including viruses, parasites, fungi, and cancer.

Course Importance: Cells are living factories that are capable of adapting their production line to any changes in the environment. Hence, cells encountering a toxic environment will evolve their machinery to maintain survival and replication. Such adaptation, called Antimicrobial Resistance, is commonly observed across bacteria, viruses, parasites, and fungi. However, only recently the overuse of antimicrobial agents created a high selection pressure to drive a wide-spread of resistance. While we are currently witnessing a constant increase of antimicrobial resistance, the development of novel treatments has almost completely ceased. This course will provide an extensive background on antimicrobial resistance, treatments, and respective mechanisms.

Time and Location

Online pre-recorded classes for the upcoming week (M-W-F lectures) will be made available every Sunday. New lectures are uploaded weekly onto Canvas (see access instructions below)

Instructor

Dr. Daniel Czyż (*chysh*)
Department of Microbiology and Cell Science
1355 Museum Drive
Office: Room 1004, Building 981
Phone: 352-392-0237
Email: dczyz@ufl.edu
Twitter: @360Science
Slack: AMR-UF, the app can be downloaded on a desktop, Android, or iOS
Preferred method of communication with the instructor regarding the course is by Slack

Office hours: Tuesdays 9-10 AM or by appointment
Virtual office hours: Fridays 9-10 AM (EST) or by appointment. Office hours will be available through Canvas Video Conference (Blue Button) or a phone call

To request an office hours appointment, send an e-mail directly to the instructor with three suggested dates/times.

Instructor's Teaching Philosophy

"*Your work is going to fill a large part of your life, and the only way to be truly satisfied is to do what you believe is great work*" - Steve Jobs

You embrace education; devote your time to pursue your goals, strive for success, and do your best, but sometimes you are just hitting obstacles that prevent you from moving forward. That's when you wish you would have a good mentor. I've helped people who hit obstacles get right back on track, but more

importantly, I help my mentees and students avoid hitting obstacles in the first place. I always make sure I am available for my students and my colleagues, whether it's in a classroom or in a laboratory setting. As a scientist, I put a lot of time and emphasis on my trainees providing them with the right personalized support plan to guide them towards their short and long-term goals, as their success is my success. As an educator, my primary objectives are to retain students' attention, promote creativity and teamwork, and encourage out-of-classroom learning.

I find science to be the most fascinating and exciting subject to teach, mostly because it is never fully explored and with the ongoing new discoveries, teaching becomes learning. Science can be found in our everyday life and I believe that relating new information to practical application in daily lives focuses students' attention and enhances learning. For that reason, I link my lecture material to everyday applications as much as possible.

I encourage and expect students to employ out-of-textbooks material, including public databases, online tools, and primary literature. While independent projects are important, in science, single-person projects are nearly nonexistent. I strongly believe that assigning students to group projects strengthens their team-building core, helps to develop essential communication skills, and exposes students to conflicts and teaches them how to deal with them. Most importantly, an assignment might seem difficult for an individual student but becomes trivial when done as a team.

Finally, I put emphasis on mentorship and participation in extracurricular activities. My students are expected to mentor each other because it will help them develop essential skills in their future careers. It's never too early to become a mentor. Finally, I truly believe that building a career is not solely attained during classroom education. Participation in community outreach events, conferences, seminars, and symposia is just as important as classroom-based learning. These extracurricular activities build leadership and improve communication skills and I strongly encourage my students to participate in such activities.

Course Level & Prerequisites

The course is designed for both undergraduate-level and graduate students.
The course requires graduate students to have a Bachelor's degree in biology or a related field.
Important concepts will be briefly reviewed to provide students with a better understanding of the subject.

Course Objectives

After completion of this course, students should be able to:

- Outline problems associated with antimicrobial resistance across healthcare, agriculture, and the environment
- Explain resistance mechanisms in viruses, fungi, parasites, and cancer
- Identify major classes of antibiotics and their respective mechanisms of action
- Describe known mechanisms of antibiotic resistance and modes of transmission
- Identify means of detection/assessment of antibiotic resistance
- Describe therapeutic approaches used to fight antibiotic resistance
- Recognize scientific terms related to antimicrobial resistance
- Assess risks associated with antibiotic-resistant infections
- Employ online databases to utilize genomic, chemical, and epidemiological data on AMR

Learning Assessment

Grades are used to assess your learning progress. The vast extent of the information covered by this course should not discourage students. This course is designed to teach you and not fail you. If you encounter any learning difficulties that will affect your grades/learning progress, contact the professor as soon as possible.

GRADING SCALE (total: 830 pts)

	Graduate Students	
	Percentage	Score range
A	>93.4	>775
A-	93.3-90.0	774-747
B+	89.9-86.6	746-719
B	86.5-83.4	718-692
B-	83.3-80.0	691-664
C+	79.9-76.5	663-635
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D+	69.9-66.6	580-553
D	66.5-63.3	552-525
D-	63.2-60.0	524-498
E	<60.0	<498

EXAMS (700 pts):

Exam I, September 18, 2019: Covers lectures 1-11. (100 pts)
Exam II, October 18, 2019: Covers lectures 1-23. (200 pts)
Exam III, November 13, 2019: Covers lectures 24-32. (100 pts)
Exam IV, December 9, 2019: Covers lectures 1-43 (300 pts)

Exams will assess student knowledge of the material covered in lectures, assignments, and required reading/video material. The lowest exam score (either Exam I or III only) will be dropped. All exams are mandatory and only students who take all four exams will be able to drop one. Each exam will take approximately 50 minutes (final exam will take 2x time) to complete and will consist of multiple-choice questions, true/false, fill in the blanks, sentence completion, definition matching, and short-answer questions. Students must sign up on ProctorU at least 72 hours in advance. The academic honesty will be remotely monitored in real-time by assigned course proctors. For more information about academic honesty, please see the **Student Honor Code**.

QUIZZES (100 pts):

There will be 11 quizzes (10 points each, 100 points total plus 10 extra credit points). See the Course Content (below) for dates. Quizzes will cover lecture material and assigned reading/video material. There will be one Extra Credit Quiz during the first week. This will be an introductory quiz that will cover students' understanding of the syllabus and course requirements.

WRITING ASSIGNMENTS (130 pts):

At the end of every Monday lecture, the instructor will assign a reading/video. Written assignments will be due every Saturday (11:59 PM EST) following the introduction of the assignment. Only graduate

students registered for the course have to turn in the written assignments. There will be 13 written assignments worth 10 points each for a total of 130 points. Graduate students are required to provide a brief answer to questions that relate to each assigned reading/video in a single abstract form (sample abstract is provided with Assignment No. 1). The response should not take more than 250 words in total – adhering to this limit is a must. The purpose of these assignments is to link the course material to real cases, encourage creative thinking, and assess your learning. See "Late Submission" for information related to late work. See the "Assignments" section for more details.

EXTRA CREDIT: The professor may offer an extra credit written assignment.

Grades and Grade Points

For information on current UF policies for assigning grade points, see https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/.

Late Submission

Graduate students who turn in late writing assignments will be penalized 10% of the total score for each late day up to three days. After three days, no late submissions will be accepted. Students with special medical or family problems should contact the instructor directly.

Attendance and Make-Up Work

Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at:
https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/.

Website

Course material can be accessed through Canvas.
https://ufl.instructure.com/

Technical issues related to the course can be addressed to UF helpdesk
http://helpdesk.ufl.edu, 352-393-4357, helpdesk@ufl.edu

Communication

For questions and issues on assignments and class organization please check first the syllabus, the announcements, calendar, and the Course Handout. To seek further help, please communicate with the instructor via **Slack** or email. For questions regarding class and class content use the Canvas **Discussion Board**.

Discussion Board: Available through Canvas. Postings and answers are monitored by the instructor
Slack: AMR-UF, the app can be downloaded on a desktop, Android, or iOS
Twitter: Follow and share science news related to the course using #AMR_UF

IMPORTANT: *Prior to the first lecture, please familiarize yourself with netiquette (cyber behavior guidelines). See below "Netiquette guide for online courses".*

Course Material

Required material: There is no textbook for this course. This course is based on peer-reviewed publications that will be provided by the instructor. The required reading material will be posted under "Assignments" in Canvas. Questions related to information from the required reading/video material will appear on quizzes and exams.

Recommended reading and other material: Additional reading material, links to videos, and other online resources will be posted under "Files" in Canvas.

Services for Students with Disabilities

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation

0001 Reid Hall, 352-392-8565, https://disability.ufl.edu/

Campus Helping Resources

Students experiencing crises or personal problems that interfere with their general wellbeing are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

These resources include:

Health & Wellness

- U Matter, We Care: If you or a friend is in distress, please contact umatter@ufl.edu or tel. 352-392-1575 so that a team member can reach out to the student. http://www.umatter.ufl.edu/
- University Counseling and Wellness Center: Provides counseling services to students 3190 Radio Road. Tel. 352-392-1575. https://counseling.ufl.edu/
    - Counseling Services
    - Groups and Workshops
    - Outreach and Consultation
    - Self-Help Library
    - Wellness Coaching
- Sexual Assault Recovery Services (SARS): Provides services related to sexual violence. Tel. 352-392-5648. http://www.umatter.ufl.edu/sexual_violence
- Student Health Care Center: Student health-related services. Tel. 352-392-1161. https://shcc.ufl.edu/

- Gator Career Closet: Serves as a lending closet for students to borrow professional clothing and accessories free of charge. This service is available to all UF students with a valid UF ID. Tel. 352-392-1601. https://career.ufl.edu/careercloset/
- Food Pantry: Offers non-perishable food, toiletries, and fresh vegetables. This service is provided to current students, staff, and faculty at the University of Florida. Gator 1 ID is required, but no proof of need is required.

For emergencies call the University Police Department at 352-392-1111 (or 911).

Academic Resources

E-learning technical support: Tel. 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://lss.at.ufl.edu/help.shtml.

Career Connection Center, First Floor JWRU: Career assistance and counseling. Tel. 352-392-1601. https://career.ufl.edu/.

Library Support: Various ways to receive assistance with respect to using the libraries or finding resources. Text 813-463-2283 or Tel. 866-281-6309. http://cms.uflib.ufl.edu/ask

Teaching Center, Broward Hall: General study skills and tutoring. Tel. 352-392-2010 or 352-392-6420. http://teachingcenter.ufl.edu/

Writing Studio, 302 Tigert Hall: Help brainstorming, formatting, and writing papers. Tel. 352-846-1138. http://writing.ufl.edu/writing-studio/

Online Course Evaluation Process

Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at: https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at: https://gatorevals.aa.ufl.edu/public-results/.

Setting up VPN

To access UF resources and journal articles off-campus, please set up a Virtual Private Network (VPN). VPN allows you to remotely connect to UF services (i.e. library, UF servers). For detailed instructions on how to set up VPN visit: https://it.clas.ufl.edu/kb/category/vpn/

Netiquette guide for online courses

It is important to recognize that the online classroom is in fact a classroom, and certain behaviors are expected when you communicate with both your peers and your instructors.
These guidelines for online behavior and interaction are known as netiquette.

http://teach.ufl.edu/wp-content/uploads/2012/08/NetiquetteGuideforOnlineCourses.pdf

Academic Honesty

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: "*We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity*." You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied: "*On my honor, I have neither given nor received unauthorized aid in doing this assignment*." It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code. If you have any questions or concerns, please consult with the instructor. Additional policies on academic integrity can be found in the Orange Book.

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- Manipulate and/or distribute any materials provided in this course for any purpose (including course lecture slides).
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	No Class	09/02/19	*Happy Labor Day*	
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	11	09/13/19	Antibiotics: Other Mechanisms of Action	Assignment 3
	12	09/16/19	Lecture 1-11 Exam Review	
5	13	09/18/19	No Lecture, Exam I covering lectures 1-11	EXAM
	14	09/20/19	Antibiotic Resistance: Overview	Assignment 4
	15	09/23/19	Antibiotic Resistance: Modification/Destruction of Antibioitics	
6	16	09/25/19	Antibiotic Resistance: Efflux Pumps	Quiz 4
	17	09/27/19	Antibiotic Resistance: Target Modification	Assignment 5
	18	09/30/19	Antibiotic Resistance: Bacterial Biofilms	
7	19	10/02/19	Multidrug Resistant Bacteria: No ESKAPE	Quiz 5
	No Class	10/04/19	*Happy Homecoming*	Assignment 6
	20	10/07/19	Multidrug Resistant Bacteria: MRSA/VRSA	
8	21	10/09/19	Antibiotic Resistance Reservoirs	Quiz 6
	22	10/11/19	Modes of Transmission	Assignment 7
	23	10/14/19	Antimicrobial Resistance in Sexually Transmitted Infections	
9	24	10/16/19	Lecture 1-23 Exam Review	Evaluations*
	25	10/18/19	No Lecture, Exam II covering lectures 12-23	EXAM
	26	10/21/19	Antimicrobial Resistance Assessment, Part I	
10	27	10/23/19	Antimicrobial Resistance Assessments, Part II	
	28	10/25/19	Therapeutics: Hunt for Novel Antibiotics	Assignment 8
	29	10/28/19	Therapeutics: Host-targeted Therapeutics, Part I	
11	30	10/30/19	Therapeutics: Host-targeted Therapeutics, Part II	Quiz 7
	31	11/01/19	Therapeutics: Alternative Medicine	Assignment 9
	32	11/04/19	Prophylaxis and Control Measures	
12	33	11/06/19	Lecture 24-32 Exam Review	
	34	11/08/19	No Lecture, Exam III covering lectures 24-32	Assignment 10
	No Class	11/11/19		
13	35	11/13/19	Antimicrobial Resistance: Viral Infections, Part I	EXAM III
	36	11/15/19	Antimicrobial Resistance: Viral Infections, Part II	Assignment 11
	37	11/18/19	Antimicrobial Resistance: Fungal Infections, Part I	
14	38	11/20/19	Antimicrobial Resistance: Fungal Infections, Part II	Quiz 8
	39	11/22/19	Antimicrobial Resistance: Parasitic Infections, Part I	Assignment 12
	40	11/25/19	Pesticide Resistance: Genetically Modified Organisms	
15	41	11/27/19	Drug Resistance in Cancer 	Quiz 9
	No Class	11/29/19	*Happy Thanksgiving*	Assignment 13
	42	12/02/19	Lectures 1-23 Final Exam Review	Evaluation**
16	43	12/04/19	Lectures 24-43 Final Exam Review	Quiz 10
	No Class	12/06/19	Reading Day	
	No Class	12/09/19	Final Exam	
17	No Class	12/11/19	*Have a safe winter break!*  	
	No Class	12/13/19		

*Required informal course and instructor evaluation
**Final and official course evaluation

Assignments

Week	Lecture	Date	Assigned Reading *	Assignment
	1	08/19/19	Antibiotic Resistance Threats in the US	Hunting the Nightmare Bacteria, part I
1	2	08/21/19	Reducing Antimicrobial Use in Food Animals	
	3	08/23/19	Antibiotic-Resistance Genes in Wastewater	
	4	08/26/19	Discovery of penicillin	Hunting the Nightmare Bacteria, part II
2	5	08/28/19	Antibiotic Use in Fish Industry	
	6	08/30/19	Water Sustainability and Public Health Goals	
	No Class	09/02/19	Gram-negative vs Gram-positive	No Assignment
3	7	09/04/19	Bacterial Wall as Target to Attack	
	8	09/06/19	Future of AMR	
	9	09/09/19	Discovery of tetracycline	Hunting the Nightmare Bacteria, part III
4	10	09/11/19	Antibiotic for Emerging Pathogens	KPC Outbreak
	11	09/13/19	Other approaches	
	12	09/16/19	No reading assigned	TED Talk: Antibiotic Resistance
5	13	09/18/19	No reading assigned	
	14	09/20/19	The Origin and Molecular Basis of ABR	
	15	09/23/19	Enzymatic Degradation and Modification	Antibiotics in Healthy Animals
6	16	09/25/19	Efflux Pumps in ABR	
	17	09/27/19	Modified Target Sites	
	18	09/30/19	ABR of Bacterial Biofilms	CARD
7	19	10/02/19	No ESKAPE!	
	No Class	10/04/19	MRSA	
	20	10/07/19	Reservoirs of AMR	STITCH
8	21	10/09/19	HGT Warfare	
	22	10/11/19	AMR in STIs	
	23	10/14/19	No reading assigned	No Assignment
9	24	10/16/19	No reading assigned	
	25	10/18/19	No reading assigned	
	26	10/21/19	No reading assigned	PubChem
10	27	10/23/19	No reading assigned	
	28	10/25/19	Antimicrobial Susceptibility Testing	
	29	10/28/19	Diagnosing AMR	Resistance Map
11	30	10/30/19	Platforms for Antibiotic Discovery	
	31	11/01/19	Host-directed Antimicrobial Drug Discovery	
	32	11/04/19	Targeting host metabolism	Phage Treatment of P. aeruginosa
12	33	11/06/19	Revising Natural Products	
	34	11/08/19	National Action Plan for Combating ABR	
	No Class	11/11/19	No reading assigned	Antimicrobial Peptides
13	35	11/13/19	No reading assigned	
	36	11/15/19	Antiviral Drug Resistance	
	37	11/18/19	Influenza Antiviral Drug Resistance	FDA Drug Repurposing
14	38	11/20/19	Antifungal Agents: Mechanisms of Action	
	39	11/22/19	Antifungal Agents	
	40	11/25/19	Antiparasitic Chemotherapy	Protecting Yourself & Family
15	41	11/27/19	GM crops	
	No Class	11/29/19	Cancer Drug Resistance	
	42	12/02/19	No reading assigned	No Assignment
16	43	12/04/19	No reading assigned	
	No Class	12/06/19	No reading assigned	

*All assigned reading will be posted on Course Canvas in pdf format

MCB6XXX syllabus

MCB4XXX: Antimicrobial Resistance 3 credits

Course Description

UF Catalog: This course covers content related to antimicrobial resistance: the origins of antimicrobial resistance, dissemination, mechanisms, therapeutics, and impact on healthcare, agriculture, and the environment. This course mainly concentrates on resistance in bacteria, but will also discuss other organisms, including viruses, parasites, fungi, and cancer.

Course Importance: Cells are living factories that are capable of adapting their production line to any changes in the environment. Hence, cells encountering a toxic environment will evolve their machinery to maintain survival and replication. Such adaptation, called Antimicrobial Resistance, is commonly observed across bacteria, viruses, parasites, and fungi. However, only recently the overuse of antimicrobial agents created a high selection pressure to drive a wide-spread of resistance. While we are currently witnessing a constant increase of antimicrobial resistance, the development of novel treatments has almost completely ceased. This course will provide an extensive background on antimicrobial resistance, treatments, and respective mechanisms.

Time and Location

Online pre-recorded classes for the upcoming week (M-W-F lectures) will be made available every Sunday. New lectures are uploaded weekly onto Canvas (see access instructions below)

Instructor

Dr. Daniel Czyz (*chysh*)
Department of Microbiology and Cell Science
1355 Museum Drive
Office: Room 1004, Building 981
Phone: 352-392-0237
Email: dczyz@ufl.edu
Twitter: @360Science
Slack: AMR-UF, the app can be downloaded on a desktop, Android, or iOS

Office hours: Tuesdays 9-10 AM or by appointment
Virtual office hours: Fridays 9-10 AM (EST) or by appointment. Office hours will be available through Canvas Video Conference (Blue Button) or a phone call

To request an office hours appointment, send an e-mail directly to the instructor with three suggested dates/times.

Instructor's Teaching Philosophy

"*Your work is going to fill a large part of your life, and the only way to be truly satisfied is to do what you believe is great work*" - Steve Jobs

You embrace education; devote your time to pursue your goals, strive for success, and do your best, but sometimes you are just hitting obstacles that prevent you from moving forward. That's when you wish you would have a good mentor. I've helped people who hit obstacles get right back on track, but more importantly, I help my mentees and students avoid hitting obstacles in the first place. I always make sure

I am available for my students and my colleagues, whether it's in a classroom or in a laboratory setting. As a scientist, I put a lot of time and emphasis on my trainees providing them with the right personalized support plan to guide them towards their short and long-term goals, as their success is my success. As an educator, my primary objectives are to retain students' attention, promote creativity and teamwork, and encourage out-of-classroom learning.

I find science to be the most fascinating and exciting subject to teach, mostly because it is never fully explored and with the ongoing new discoveries, teaching becomes learning. Science can be found in our everyday life and I believe that relating new information to practical application in daily lives focuses students' attention and enhances learning. For that reason, I link my lecture material to everyday applications as much as possible.

I encourage and expect students to employ out-of-textbooks material, including public databases, online tools, and primary literature. While independent projects are important, in science, single-person projects are nearly nonexistent. I strongly believe that assigning students to group projects strengthens their team-building core, helps to develop essential communication skills, and exposes students to conflicts and teaches them how to deal with them. Most importantly, an assignment might seem difficult for an individual student but becomes trivial when done as a team.

Finally, I put emphasis on mentorship and participation in extracurricular activities. My students are expected to mentor each other because it will help them develop essential skills in their future careers. It's never too early to become a mentor. Finally, I truly believe that building a career is not solely attained during classroom education. Participation in community outreach events, conferences, seminars, and symposia is just as important as classroom-based learning. These extracurricular activities build leadership and improve communication skills and I strongly encourage my students to participate in such activities.

Course Level & Prerequisites

The course is designed for both undergraduate-level and graduate students.
The course requires undergraduate students to have the following prerequisites: Either MCB2000, MCB3020, or MCB3023. Important concepts will be briefly reviewed to provide students with a better understanding of the subject.

Course Objectives

After completion of this course, students should be able to:

- Outline problems associated with antimicrobial resistance across healthcare, agriculture, and the environment
- Explain resistance mechanisms in viruses, fungi, parasites, and cancer
- Identify major classes of antibiotics and their respective mechanisms of action
- Describe known mechanisms of antibiotic resistance and modes of transmission
- Identify means of detection/assessment of antibiotic resistance
- Describe therapeutic approaches used to fight antibiotic resistance
- Recognize scientific terms related to antimicrobial resistance
- Assess risks associated with antibiotic-resistant infections
- Employ online databases to utilize genomic, chemical, and epidemiological data on AMR

Learning Assessment

Grades are used to assess your learning progress. The vast extent of the information covered by this course should not discourage students. This course is designed to teach you and not fail you. If you

encounter any learning difficulties that will affect your grades/learning progress, contact the professor as soon as possible.

GRADING SCALE (total: 700 pts)

	Undergraduate Students	
	Percentage	Score range
A	>93.4	>654
A-	93.3-90.0	653-630
B+	89.9-86.6	629-608
B	86.5-83.4	607-584
B-	83.3-80.0	583-560
C+	79.9-76.5	559-536
C	76.4-73.3	535-513
C-	73.2-70.0	512-490
D+	69.9-66.6	489-466
D	66.5-63.3	465-443
D-	63.2-60.0	442-420
E	<60.0	<420

EXAMS (700 pts):
Exam I, September 18, 2019: Covers lectures 1-11. (100 pts)
Exam II, October 18, 2019: Covers lectures 1-23. (200 pts)
Exam III, November 13, 2019: Covers lectures 24-32. (100 pts)
Exam IV, December 9, 2019: Covers lectures 1-43 (300 pts)

Exams will assess student knowledge of the material covered in lectures, assignments, and required reading/video material. The lowest exam score (either Exam I or III only) will be dropped. All exams are mandatory and only students who take all four exams will be able to drop one. Each exam will take approximately 50 minutes (final exam will take 2x time) to complete and will consist of multiple-choice questions, true/false, fill in the blanks, sentence completion, definition matching, and short-answer questions. Students must sign up on ProctorU at least 72 hours in advance. The academic honesty will be remotely monitored in real-time by assigned course proctors. For more information about academic honesty, please see the **Student Honor Code**. For additional information on Grading Policies please visit https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/

QUIZZES (100 pts):
There will be 11 quizzes (10 points each, 100 points total plus 10 extra credit points). See the Course Content (below) for dates. Quizzes will cover lecture material and assigned reading/video material. There will be one Extra Credit Quiz during the first week. This will be an introductory quiz that will cover students' understanding of the syllabus and course requirements.

EXTRA CREDIT: The professor may offer an extra credit written assignment.

Grades and Grade Points

For information on current UF policies for assigning grade points, see https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/.

Attendance and Make-Up Work

Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at:
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Website

Course material can be accessed through Canvas.
https://ufl.instructure.com/

Technical issues related to the course can be addressed to UF helpdesk
http://helpdesk.ufl.edu, 352-393-4357, helpdesk@ufl.edu

Communication

For questions and issues on assignments and class organization please check first the syllabus, the announcements, calendar, and the Course Handout. To seek further help, please communicate with the instructor via **Slack** or email. For questions regarding class and class content use the Canvas **Discussion Board**.

Discussion Board: Available through Canvas. Postings and answers are monitored by the instructor
Slack: AMR-UF, the app can be downloaded on a desktop, Android, or iOS
Twitter: Follow and share science news related to the course using #AMR_UF

IMPORTANT: *Prior to the first lecture, please familiarize yourself with netiquette (cyber behavior guidelines). See below "Netiquette guide for online courses".*

Course Material

Required material: There is no textbook for this course. This course is based on peer-reviewed publications that will be provided by the instructor. The required reading material will be posted under "Assignments" in Canvas. Questions related to information from the required reading/video material will appear on quizzes and exams. Please refer to the "Assignment" section at the end of the syllabus for a list of Assigned Reading.

Recommended reading and other material: Additional reading material, links to videos, and other online resources will be posted under "Files" in Canvas.

Services for Students with Disabilities

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation

0001 Reid Hall, 352-392-8565, https://disability.ufl.edu/

Campus Helping Resources

Students experiencing crises or personal problems that interfere with their general wellbeing are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

These resources include:

Health & Wellness

- U Matter, We Care: If you or a friend is in distress, please contact umatter@ufl.edu or tel. 352-392-1575 so that a team member can reach out to the student. http://www.umatter.ufl.edu/
- University Counseling and Wellness Center: Provides counseling services to students 3190 Radio Road. Tel. 352-392-1575. https://counseling.ufl.edu/
    - Counseling Services
    - Groups and Workshops
    - Outreach and Consultation
    - Self-Help Library
    - Wellness Coaching
- Sexual Assault Recovery Services (SARS): Provides services related to sexual violence. Tel. 352-392-5648. http://www.umatter.ufl.edu/sexual_violence
- Student Health Care Center: Student health-related services. Tel. 352-392-1161. https://shcc.ufl.edu/
- Gator Career Closet: Serves as a lending closet for students to borrow professional clothing and accessories free of charge. This service is available to all UF students with a valid UF ID. Tel. 352-392-1601. https://career.ufl.edu/careercloset/
- Food Pantry: Offers non-perishable food, toiletries, and fresh vegetables. This service is provided to current students, staff, and faculty at the University of Florida. Gator 1 ID is required, but no proof of need is required.

For emergencies call the University Police Department at 352-392-1111 (or 911).

Academic Resources

E-learning technical support: Tel. 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://lss.at.ufl.edu/help.shtml.

Career Connection Center, First Floor JWRU: Career assistance and counseling. Tel. 352-392-1601. https://career.ufl.edu/.

Library Support: Various ways to receive assistance with respect to using the libraries or finding resources. Text 813-463-2283 or Tel. 866-281-6309. http://cms.uflib.ufl.edu/ask

Teaching Center, Broward Hall: General study skills and tutoring. Tel. 352-392-2010 or 352-392-6420. http://teachingcenter.ufl.edu/

Writing Studio, 302 Tigert Hall: Help brainstorming, formatting, and writing papers. Tel. 352-846-1138. http://writing.ufl.edu/writing-studio/

Online Course Evaluation Process

Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at: https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at: https://gatorevals.aa.ufl.edu/public-results/.

Setting up VPN

To access UF resources and journal articles off-campus, please set up a Virtual Private Network (VPN). VPN allows you to remotely connect to UF services (i.e. library, UF servers). For detailed instructions on how to set up VPN visit: https://it.clas.ufl.edu/kb/category/vpn/

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	15	09/23/19	Antibiotic Resistance: Modification/Destruction of Antibioitics	
6	16	09/25/19	Antibiotic Resistance: Efflux Pumps	Quiz 4
	17	09/27/19	Antibiotic Resistance: Target Modification	Assignment 5
	18	09/30/19	Antibiotic Resistance: Bacterial Biofilms	
7	19	10/02/19	Multidrug Resistant Bacteria: No ESKAPE	Quiz 5
	No Class	10/04/19	*Happy Homecoming*	Assignment 6
	20	10/07/19	Multidrug Resistant Bacteria: MRSA/VRSA	
8	21	10/09/19	Antibiotic Resistance Reservoirs	Quiz 6
	22	10/11/19	Modes of Transmission	Assignment 7
	23	10/14/19	Antimicrobial Resistance in Sexually Transmitted Infections	
9	24	10/16/19	Lecture 1-23 Exam Review	Evaluations*
	25	10/18/19	No Lecture, Exam II covering lectures 12-23	EXAM
	26	10/21/19	Antimicrobial Resistance Assessment, Part I	
10	27	10/23/19	Antimicrobial Resistance Assessments, Part II	
	28	10/25/19	Therapeutics: Hunt for Novel Antibiotics	Assignment 8
	29	10/28/19	Therapeutics: Host-targeted Therapeutics, Part I	
11	30	10/30/19	Therapeutics: Host-targeted Therapeutics, Part II	Quiz 7
	31	11/01/19	Therapeutics: Alternative Medicine	Assignment 9
	32	11/04/19	Prophylaxis and Control Measures	
12	33	11/06/19	Lecture 24-32 Exam Review	
	34	11/08/19	No Lecture, Exam III covering lectures 24-32	Assignment 10
	No Class	11/11/19		
13	35	11/13/19	Antimicrobial Resistance: Viral Infections, Part I	EXAM III
	36	11/15/19	Antimicrobial Resistance: Viral Infections, Part II	Assignment 11
	37	11/18/19	Antimicrobial Resistance: Fungal Infections, Part I	
14	38	11/20/19	Antimicrobial Resistance: Fungal Infections, Part II	Quiz 8
	39	11/22/19	Antimicrobial Resistance: Parasitic Infections, Part I	Assignment 12
	40	11/25/19	Pesticide Resistance: Genetically Modified Organisms	
15	41	11/27/19	Drug Resistance in Cancer 	Quiz 9
	No Class	11/29/19	*Happy Thanksgiving*	Assignment 13
	42	12/02/19	Lectures 1-23 Final Exam Review	Evaluation**
16	43	12/04/19	Lectures 24-43 Final Exam Review	Quiz 10
	No Class	12/06/19	Reading Day	
	No Class	12/09/19	Final Exam	
17	No Class	12/11/19	*Have a safe winter break!*  	
	No Class	12/13/19		

*Required informal course and instructor evaluation

**Final and official course evaluation

Assignments

Week	Lecture	Date	Assigned Reading *
	1	08/19/19	Antibiotic Resistance Threats in the US
1	2	08/21/19	Reducing Antimicrobial Use in Food Animals
	3	08/23/19	Antibiotic-Resistance Genes in Wastewater
	4	08/26/19	Discovery of penicillin
2	5	08/28/19	Antibiotic Use in Fish Industry
	6	08/30/19	Water Sustainability and Public Health Goals
	No Class	09/02/19	Gram-negative vs Gram-positive
3	7	09/04/19	Bacterial Wall as Target to Attack
	8	09/06/19	Future of AMR
	9	09/09/19	Discovery of tetracycline
4	10	09/11/19	Antibiotic for Emerging Pathogens
	11	09/13/19	Other approaches
	12	09/16/19	No reading assigned
5	13	09/18/19	No reading assigned
	14	09/20/19	The Origin and Molecular Basis of ABR
	15	09/23/19	Enzymatic Degradation and Modification
6	16	09/25/19	Efflux Pumps in ABR
	17	09/27/19	Modified Target Sites
	18	09/30/19	ABR of Bacterial Biofilms
7	19	10/02/19	No ESKAPE!
	No Class	10/04/19	MRSA
	20	10/07/19	Reservoirs of AMR
8	21	10/09/19	HGT Warfare
	22	10/11/19	AMR in STIs
	23	10/14/19	No reading assigned
9	24	10/16/19	No reading assigned
	25	10/18/19	No reading assigned
	26	10/21/19	No reading assigned
10	27	10/23/19	No reading assigned
	28	10/25/19	Antimicrobial Susceptibility Testing
	29	10/28/19	Diagnosing AMR
11	30	10/30/19	Platforms for Antibiotic Discovery
	31	11/01/19	Host-directed Antimicrobial Drug Discovery
	32	11/04/19	Targeting host metabolism
12	33	11/06/19	Revising Natural Products
	34	11/08/19	National Action Plan for Combating ABR
	No Class	11/11/19	No reading assigned
13	35	11/13/19	No reading assigned
	36	11/15/19	Antiviral Drug Resistance
	37	11/18/19	Influenza Antiviral Drug Resistance
14	38	11/20/19	Antifungal Agents: Mechanisms of Action
	39	11/22/19	Antifungal Agents
	40	11/25/19	Antiparasitic Chemotherapy
15	41	11/27/19	GM crops
	No Class	11/29/19	Cancer Drug Resistance
	42	12/02/19	No reading assigned
16	43	12/04/19	No reading assigned
	No Class	12/06/19	No reading assigned

*All assigned reading will be posted on Course Canvas in pdf format