

## Cover Sheet: Request 14340

### 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	7/22/2020 11:05:41 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					12/3/2019
AMR_Course_Syllabus_Undergraduate_CourseApproval.pdf					12/9/2019
AMR_Course_Syllabus_Graduate_CourseApproval.pdf					12/9/2019
University Curriculum Committee	Commented	PV - University Curriculum Committee (UCC)	Lee Morrison	Added to the January agenda. If approved, this will go into effect for the Summer B 2020 term with the publication of the 2020-2021 undergraduate catalog.	1/17/2020
No document changes					
University Curriculum Committee	Recycled	PV - University Curriculum Committee (UCC)	Casey Griffith	Please clarify with Office of Undergraduate Affairs, co-req/pre-req questions, upload letter of support from UF Online	1/23/2020
No document changes					
College	Approved	CALS - College of Agricultural and Life Sciences	Joel H Brendemuhl	UF Online letter of support has been uploaded and companion Graduate Course has been approved.	7/22/2020
Evie_Cummings Letter of Support CALS_Antimicrobial Resistance.pdf					7/2/2020
University Curriculum Committee	Pending	PV - University Curriculum Committee (UCC)			7/22/2020
No document changes					

Step	Status	Group	User	Comment	Updated
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:** 14340 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 Antibiotics
- 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

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

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	12
Midterm	200	24
Exam II	100	12
Final Exam	300	36
Quizzes	100	12
Assignments	130	16
<b>Total</b>	<b>830</b>	

Assignments	Level	
	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	<i>not required</i>	130
<b>Total</b>	<b>700</b>	<b>830</b>

\*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



# 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](mailto: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
<b>A</b>	>93.4	>775
<b>A-</b>	93.3-90.0	774-747
<b>B+</b>	89.9-86.6	746-719
<b>B</b>	86.5-83.4	718-692
<b>B-</b>	83.3-80.0	691-664
<b>C+</b>	79.9-76.5	663-635
<b>C</b>	76.4-73.3	634-608
<b>C-</b>	73.2-70.0	607-581
<b>D+</b>	69.9-66.6	580-553
<b>D</b>	66.5-63.3	552-525
<b>D-</b>	63.2-60.0	524-498
<b>E</b>	<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](mailto: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](mailto: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](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](https://career.ufl.edu/careercloset/): 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](mailto: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](#).

## Additional comments regarding academic integrity:

Students are encouraged to discuss the course material with each other, help each other understand concepts, study together, and even discuss assessment questions with each other once the quiz window is closed. However, the following is considered academic dishonesty, and I expect that no student will ever do any of the following:

- Have another person complete a quiz in this course
- Copy another student's quiz in this course
- Collaborate with anyone during a quiz in this course
- Discuss the questions and answers of a quiz with other students while the quiz is still open
- Manipulate and/or distribute any materials provided in this course for any purpose (including course lecture slides).
- Use any materials provided by a previous student in the course

The result of any infraction will be consistent with university policy - see "Academic Honesty".

## Software Use

All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

**Microsoft Office 365 Software is free for UF students**

<http://www.it.ufl.edu/gatorcloud/free-office-365-downloads/>

**Other free software is available at:**

<http://www.software.ufl.edu/>

To check for availability of the media and technical requirements, contact the UF Computing Help Desk at (352)392-HELP(4357).

## **University of Florida Complaints Policy and Student Complaint Process**

The University of Florida and most instructors believe strongly in the ability of students to express concerns regarding their experiences at the University. Most problems, questions and concerns about the course will be resolved by professionally communicating with the instructor. Please try to meet your instructor in person, make an appointment to call, or try to set up a remote meeting through Skype or other media. The University encourages its students who still wish to file a written complaint to submit that complaint directly to the department that manages that policy. For more information visit:

- Residential Course: <https://sccr.dso.ufl.edu/policies/student-honor-code-studentconduct-code/>.
- Online Course: <http://www.distance.ufl.edu/student-complaint-process>



Professionalism is a two-way street. Unprofessional behavior of students includes, among other things: lack of communication, blaming other people or external factors, lying, affecting others negatively in a group or in the class, not accepting criticism and not being proactive in solving problems or seeking help. Furthermore, faculty often have family and other obligations to tend to. Over the weekend, replies to your inquiries or questions may be delayed. If a student is lacking professionalism repeatedly, the instructor has the right to file a formal complaint against the student through the Dean of Student office.

## **Academic Calendar**

Students should familiarize themselves with important academic dates and deadlines available at <https://catalog.ufl.edu/UGRD/dates-deadlines/>



## Course Content

Week	Lecture	Date	Lecture topic	Due
1	1	08/19/19	Course Introduction; Antimicrobial Resistance in Healthcare	
	2	08/21/19	Antimicrobial Resistance in Agriculture	Extra Credit Quiz
	3	08/23/19	Antimicrobial Resistance in the Environment	Assignment 1
2	4	08/26/19	Penicillin Discovery and Mechanism of Action	
	5	08/28/19	Antibiotics: Cell Wall Synthesis Inhibitors, Part I	Quiz 1
	6	08/30/19	Antibiotics: Cell Wall Synthesis Inhibitors, Part II	Assignment 2
3	No Class	09/02/19	<i>Happy Labor Day</i>	
	7	09/04/19	Antibiotics: Cell Wall Synthesis Inhibitors, Part III	Quiz 2
	8	09/06/19	Antibiotics: Folate Synthesis Inhibitors	
4	9	09/09/19	Antibiotics: Protein Synthesis Inhibitors, Part I	
	10	09/11/19	Antibiotics: Protein Synthesis Inhibitors, Part II	Quiz 3
	11	09/13/19	Antibiotics: Other Mechanisms of Action	Assignment 3
5	12	09/16/19	Lecture 1-11 Exam Review	
	13	09/18/19	No Lecture, Exam I covering lectures 1-11	EXAM
	14	09/20/19	Antibiotic Resistance: Overview	Assignment 4
6	15	09/23/19	Antibiotic Resistance: Modification/Destruction of Antibiotics	
	16	09/25/19	Antibiotic Resistance: Efflux Pumps	Quiz 4
	17	09/27/19	Antibiotic Resistance: Target Modification	Assignment 5
7	18	09/30/19	Antibiotic Resistance: Bacterial Biofilms	
	19	10/02/19	Multidrug Resistant Bacteria: No ESKAPE	Quiz 5
	No Class	10/04/19	<i>Happy Homecoming</i>	Assignment 6
8	20	10/07/19	Multidrug Resistant Bacteria: MRSA/VRSA	
	21	10/09/19	Antibiotic Resistance Reservoirs	Quiz 6
	22	10/11/19	Modes of Transmission	Assignment 7
9	23	10/14/19	Antimicrobial Resistance in Sexually Transmitted Infections	
	24	10/16/19	Lecture 1-23 Exam Review	Evaluations*
	25	10/18/19	No Lecture, Exam II covering lectures 12-23	EXAM
10	26	10/21/19	Antimicrobial Resistance Assessment, Part I	
	27	10/23/19	Antimicrobial Resistance Assessments, Part II	
	28	10/25/19	Therapeutics: Hunt for Novel Antibiotics	Assignment 8
11	29	10/28/19	Therapeutics: Host-targeted Therapeutics, Part I	
	30	10/30/19	Therapeutics: Host-targeted Therapeutics, Part II	Quiz 7
	31	11/01/19	Therapeutics: Alternative Medicine	Assignment 9
12	32	11/04/19	Prophylaxis and Control Measures	
	33	11/06/19	Lecture 24-32 Exam Review	
	34	11/08/19	No Lecture, Exam III covering lectures 24-32	Assignment 10
13	No Class	11/11/19		
	35	11/13/19	Antimicrobial Resistance: Viral Infections, Part I	EXAM III
	36	11/15/19	Antimicrobial Resistance: Viral Infections, Part II	Assignment 11
14	37	11/18/19	Antimicrobial Resistance: Fungal Infections, Part I	
	38	11/20/19	Antimicrobial Resistance: Fungal Infections, Part II	Quiz 8
	39	11/22/19	Antimicrobial Resistance: Parasitic Infections, Part I	Assignment 12
15	40	11/25/19	Pesticide Resistance: Genetically Modified Organisms	
	41	11/27/19	Drug Resistance in Cancer 	Quiz 9
	No Class	11/29/19	<i>Happy Thanksgiving</i>	Assignment 13
16	42	12/02/19	Lectures 1-23 Final Exam Review	Evaluation**
	43	12/04/19	Lectures 24-43 Final Exam Review	Quiz 10
	No Class	12/06/19	Reading Day	
17	No Class	12/09/19	Final Exam	
	No Class	12/11/19	<i>Have a safe winter break!</i> 	
	No Class	12/13/19		

\*Required informal course and instructor evaluation

\*\*Final and official course evaluation

## Assignments

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

<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](mailto: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](mailto:umatter@ufl.edu): If you or a friend is in distress, please contact [umatter@ufl.edu](mailto: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](https://counseling.ufl.edu/): 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](http://www.umatter.ufl.edu/sexual_violence) (SARS): Provides services related to sexual violence. Tel. 352-392-5648. [http://www.umatter.ufl.edu/sexual\\_violence](http://www.umatter.ufl.edu/sexual_violence)
- [Student Health Care Center](https://shcc.ufl.edu/): Student health-related services. Tel. 352-392-1161. <https://shcc.ufl.edu/>
- [Gator Career Closet](https://career.ufl.edu/careercloset/): 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).**

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



[Writing Studio](http://writing.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/>.

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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](#).

### **Additional comments regarding academic integrity:**

Students are encouraged to discuss the course material with each other, help each other understand concepts, study together, and even discuss assessment questions with each other once the quiz window is closed. However, the following is considered academic dishonesty, and I expect that no student will ever do any of the following:

- Have another person complete a quiz in this course
- Copy another student's quiz in this course
- Collaborate with anyone during a quiz in this course
- Discuss the questions and answers of a quiz with other students while the quiz is still open
- Manipulate and/or distribute any materials provided in this course for any purpose (including course lecture slides).
- Use any materials provided by a previous student in the course

The result of any infraction will be consistent with university policy - see "Academic Honesty".

### **Software Use**

All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

#### **Microsoft Office 365 Software is free for UF students**

<http://www.it.ufl.edu/gatorcloud/free-office-365-downloads/>

#### **Other free software is available at:**

<http://www.software.ufl.edu/>

To check for availability of the media and technical requirements, contact the UF Computing Help Desk at (352)392-HELP(4357).

### **University of Florida Complaints Policy and Student Complaint Process**

The University of Florida and most instructors believe strongly in the ability of students to express concerns regarding their experiences at the University. Most problems, questions and concerns about the course will be resolved by professionally communicating with the instructor. Please try to meet your instructor in person, make an appointment to call, or try to set up a remote meeting through Skype or other media. The University encourages its students who still wish to file a written complaint to submit that complaint directly to the department that manages that policy. For more information visit:

- Residential Course: <https://sccr.dso.ufl.edu/policies/student-honor-code-studentconduct-code/>.
- Online Course: <http://www.distance.ufl.edu/student-complaint-process>

Professionalism is a two-way street. Unprofessional behavior of students includes, among other things: lack of communication, blaming other people or external factors, lying, affecting others negatively in a group or in the class, not accepting criticism and not being proactive in solving problems or seeking help. Furthermore, faculty often have family and other obligations to tend to. Over the weekend, replies to





MCB4XXX syllabus

your inquiries or questions may be delayed. If a student is lacking professionalism repeatedly, the instructor has the right to file a formal complaint against the student through the Dean of Student office.

### **Academic Calendar**

Students should familiarize themselves with important academic dates and deadlines available at <https://catalog.ufl.edu/UGRD/dates-deadlines/>

## Course Content

Week	Lecture	Date	Lecture topic	Due
1	1	08/19/19	Course Introduction; Antimicrobial Resistance in Healthcare	
	2	08/21/19	Antimicrobial Resistance in Agriculture	Extra Credit Quiz
	3	08/23/19	Antimicrobial Resistance in the Environment	Assignment 1
2	4	08/26/19	Penicillin Discovery and Mechanism of Action	
	5	08/28/19	Antibiotics: Cell Wall Synthesis Inhibitors, Part I	Quiz 1
	6	08/30/19	Antibiotics: Cell Wall Synthesis Inhibitors, Part II	Assignment 2
3	No Class	09/02/19	<i>Happy Labor Day</i>	
	7	09/04/19	Antibiotics: Cell Wall Synthesis Inhibitors, Part III	Quiz 2
	8	09/06/19	Antibiotics: Folate Synthesis Inhibitors	
4	9	09/09/19	Antibiotics: Protein Synthesis Inhibitors, Part I	
	10	09/11/19	Antibiotics: Protein Synthesis Inhibitors, Part II	Quiz 3
	11	09/13/19	Antibiotics: Other Mechanisms of Action	Assignment 3
5	12	09/16/19	Lecture 1-11 Exam Review	
	13	09/18/19	No Lecture, Exam I covering lectures 1-11	EXAM
	14	09/20/19	Antibiotic Resistance: Overview	Assignment 4
6	15	09/23/19	Antibiotic Resistance: Modification/Destruction of Antibiotics	
	16	09/25/19	Antibiotic Resistance: Efflux Pumps	Quiz 4
	17	09/27/19	Antibiotic Resistance: Target Modification	Assignment 5
7	18	09/30/19	Antibiotic Resistance: Bacterial Biofilms	
	19	10/02/19	Multidrug Resistant Bacteria: No ESKAPE	Quiz 5
	No Class	10/04/19	<i>Happy Homecoming</i>	Assignment 6
8	20	10/07/19	Multidrug Resistant Bacteria: MRSA/VRSA	
	21	10/09/19	Antibiotic Resistance Reservoirs	Quiz 6
	22	10/11/19	Modes of Transmission	Assignment 7
9	23	10/14/19	Antimicrobial Resistance in Sexually Transmitted Infections	
	24	10/16/19	Lecture 1-23 Exam Review	Evaluations*
	25	10/18/19	No Lecture, Exam II covering lectures 12-23	EXAM
10	26	10/21/19	Antimicrobial Resistance Assessment, Part I	
	27	10/23/19	Antimicrobial Resistance Assessments, Part II	
	28	10/25/19	Therapeutics: Hunt for Novel Antibiotics	Assignment 8
11	29	10/28/19	Therapeutics: Host-targeted Therapeutics, Part I	
	30	10/30/19	Therapeutics: Host-targeted Therapeutics, Part II	Quiz 7
	31	11/01/19	Therapeutics: Alternative Medicine	Assignment 9
12	32	11/04/19	Prophylaxis and Control Measures	
	33	11/06/19	Lecture 24-32 Exam Review	
	34	11/08/19	No Lecture, Exam III covering lectures 24-32	Assignment 10
13	No Class	11/11/19		
	35	11/13/19	Antimicrobial Resistance: Viral Infections, Part I	EXAM III
	36	11/15/19	Antimicrobial Resistance: Viral Infections, Part II	Assignment 11
14	37	11/18/19	Antimicrobial Resistance: Fungal Infections, Part I	
	38	11/20/19	Antimicrobial Resistance: Fungal Infections, Part II	Quiz 8
	39	11/22/19	Antimicrobial Resistance: Parasitic Infections, Part I	Assignment 12
15	40	11/25/19	Pesticide Resistance: Genetically Modified Organisms	
	41	11/27/19	Drug Resistance in Cancer 	Quiz 9
	No Class	11/29/19	<i>Happy Thanksgiving</i>	Assignment 13
16	42	12/02/19	Lectures 1-23 Final Exam Review	Evaluation**
	43	12/04/19	Lectures 24-43 Final Exam Review	Quiz 10
	No Class	12/06/19	Reading Day	
17	No Class	12/09/19	Final Exam	
	No Class	12/11/19	<i>Have a safe winter break!</i> 	
	No Class	12/13/19	 	

\*Required informal course and instructor evaluation

\*\*Final and official course evaluation

## Assignments

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

May 21, 2020

University Curriculum Committee  
Office of Undergraduate Affairs  
235 Tigert Hall  
Gainesville, FL 32611

Dear members of the University Curriculum Committee:

With this letter, I would like to offer my support for the College of Agricultural and Life Sciences (CALs) to offer Antimicrobial Resistance (MCB 4XXX) via the University of Florida (UF) Online pathway. I believe that this course will contribute positively to the needs of students and fortify an already robust program.

UF Online looks forward to seeing this program thrive for many years to come!

Sincerely,



Evangeline J. Tsibris Cummings  
Assistant Provost and Director of UF Online

Cc:

Dr. Daniel Czyz, Department of Microbiology and Cell Science, College of Agricultural and Life Sciences