

Fall 2020

## EVSC 627-101: Environmental Microbiology

Mengyan Li

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## Chemistry: *Fall 2020 Course Syllabus*

**NJIT Academic Integrity Code:** All Students should be aware that the Department of Chemistry & Environmental Science (CES) takes the University Code on Academic Integrity at NJIT very seriously and enforces it strictly. This means that there must not be any forms of plagiarism, i.e., copying of homework, class projects, or lab assignments, or any form of cheating in quizzes and exams. Under the University Code on Academic Integrity, students are obligated to report any such activities to the Instructor.

### COURSE INFORMATION

**Course Description:** This course provides a comprehensive overview of the important microorganisms and microbial processes involved in a variety of natural and engineered environments. Conventional and advanced techniques for laboratory culturing and molecular monitoring will be introduced in combination with trending environmental topics covering nutrient cycling, bioremediation, microbial induced corrosion, greenhouse gas emission, antibiotic resistance, and wastewater treatment, water disinfection. Traditional lectures and exams will be supplemented with discussions of experimental design and data interpretation by reading current research articles and field cases.

**Number of Credits:** 3

**Prerequisites:** N / A

#### Course-Section and Instructors

Course-Section	Instructor
EVSC 385-101	Dr. Mengyan Li
EVSC 627-101	Dr. Mengyan Li

#### Office Hours for All Chemistry & Environmental Science Instructors:

Email: [mengyan.li@njit.edu](mailto:mengyan.li@njit.edu)

Office Hours: Tue from 1:00-3:00 PM or by appointment

#### Required Textbook:

<b>Title</b>	Environmental Microbiology
<b>Author</b>	Ian L. Pepper, Charles P. Gerba, Terry J. Gentry
<b>Edition</b>	3rd Edition
<b>Publisher</b>	Academic Press
<b>ISBN #</b>	0123946263

**University-wide Withdrawal Date:** The last day to withdraw with a **W** is Monday, November 9, 2020. It will be strictly enforced.

**Learning Outcomes:**

Students will:

1. Learn the distribution and diversity of microorganisms in the environment;
2. Understand the important roles of microorganisms in both the natural and engineered environments;
3. Master the molecular and physiological principals governing microbiology;
4. Understand the advantages and limitations of current tools for characterizing microbial populations and monitoring their activity in the environment;
5. Formulate scientific papers to review trending topics and convert ideas of engineering solutions.

**POLICIES**

All CES students must familiarize themselves with, and adhere to, all official university-wide student policies. CES takes these policies very seriously and enforces them strictly.

**Grading Policy:** The final grade in this course will be determined as follows:

<b>Homework</b>	24%
<b>Term Paper</b>	16%
<b>Midterm Exam</b>	30%
<b>Final Exam</b>	30%

Your final letter grade in this course will be based on the following tentative curve:

<b>A</b>	85-100	<b>C</b>	55-64
<b>B+</b>	80-84	<b>D</b>	50-54
<b>B</b>	70-79	<b>F</b>	<50
<b>C+</b>	65-69		

**Attendance Policy:** Attendance at classes will be recorded and is **mandatory**. Each class is a learning experience that cannot be replicated through simply “getting the notes.”

**Homework Policy:** Homework assignments are posted on Canvas. Homework problems are mainly multiple-choice and submission due is every Monday 11:59 PM on Canvas (No hard copy submission is accepted). Answers will be provided online.

**Term Paper:** Students will be asked to select a topic in the field of environmental microbiology and outline the importance, principles, mechanisms, design, operation, application, and limitation, if appropriate for the selected topic. The term paper will be judged based on the comprehension of the scope (40%) and thoroughness of the content (20%), as well as the overall quality of writing (40%). Students are encouraged to consult with the instructor for the preparation of the term paper. Specifically, students should understand the definition of plagiarism. The information on plagiarism at the link is required reading: <https://honorcouncil.georgetown.edu/whatisplagiarism>.

**Exams:** Exams are online, but closed book/note. Exams consist of 10 to 20 short/open answer questions. The exams will be 90 minutes each and held during regular class time or the final period. Please be on time for exams as no extra time will be given if you are late. The following exam periods are tentative and therefore possibly subject to change:

Exam I	October 20
Exam II	December 8

The exam I and II will test your knowledge of the course material taught in Weeks 1-7 and 9-14, respectively.

**Makeup Exam Policy:** There will normally be **NO MAKE-UP QUIZZES OR EXAMS** during the semester. In the event that a student has a legitimate reason for missing a quiz or exam, the student should contact the Dean of Students office and present written verifiable proof of the reason for missing the exam, e.g., a doctor's note, police report, court notice, etc. clearly stating the date AND time of the mitigating problem. The student must also notify the CES Department Office/Instructor that the exam will be missed so that appropriate steps can be taken to make up the grade.

**Cellular Phones:** All cellular phones and other electronic devices must be switched off during all class times. Such devices must be stowed in bags during exams or quizzes.

**Ethics:** The shift to remote and converged teaching due to the COVID-19 pandemic has required that both instructors and students make changes to their normal working protocols for courses. Students are asked to practice extra care and attention in regard to academic honesty, with the understanding that all cases of plagiarism, cheating, multiple submission, and unauthorized collaboration are subject to penalty. Students must properly cite and attribute all sources used for papers and assignments. Students may not collaborate on exams or assignments, directly or through virtual consultation, unless the instructor gives specific permission to do so. Posting an exam, assignment, or answers to them on an online forum (before, during, or after the due date), in addition to consulting posted materials, constitutes a violation of the university's Honesty policy. Likewise, unauthorized use of live assistance websites, including seeking "expert" help for specific questions during an exam, can be construed as a violation of the honesty policy. All students should be familiar with the [NJIT Academic Integrity Code](#).

## ADDITIONAL RESOURCES

**Chemistry Tutoring Center:** Located in the Central King Building, Lower Level, Rm. G12. Hours of operation are Monday - Friday 10:00 am - 6:00 pm. For further information please click [here](#).

**Accommodation of Disabilities:** Office of Accessibility Resources and Services (*formerly known as Disability Support Services*) offers long term and temporary accommodations for undergraduate, graduate and visiting students at NJIT.

If you are in need of accommodations due to a disability please contact Chantonette Lyles, Associate Director at the Office of Accessibility Resources and Services at **973-596-5417** or via email at [lyles@njit.edu](mailto:lyles@njit.edu). The office is located in Fenster Hall Room 260. A Letter of Accommodation Eligibility from the Office of Accessibility Resources Services office authorizing your accommodations will be required.

For further information regarding self-identification, the submission of medical documentation and additional support services provided please visit the Accessibility Resources and Services (OARS) website at:

- <http://www5.njit.edu/studentssuccess/disability-support-services/>

**Important Dates** See: Fall 2020 Academic Calendar, Registrar  
<https://www5.njit.edu/registrar/fall-2020-academic-calendar/>

Date	Day	Event
September 1	T	First Day of Classes
September 5	S	Saturday Classes Begin
September 7	M	Labor Day
September 8	T	Monday Classes Meet Last Day to Add/Drop a Class Last Day for 100% Refund, Full or Partial Withdrawal
September 9	W	W Grades Posted for Course Withdrawals

September 14	M	Last Day for 90% Refund, Full or Partial Withdrawal No Refund for Partial Withdrawal after this date
September 28	M	Last Day for 50% Refund, Full Withdrawal
October 19	M	Last Day for 25% Refund, Full Withdrawal
November 9	M	Last Day to Withdraw
November 25	W	Friday Classes Meet
November 26	R	Thanksgiving Recess Begins
November 29	Su	Thanksgiving Recess Ends
December 10	R	Last Day of Classes
December 11	F	Reading Day 1
December 14	M	Reading Day 2
December 15	T	Final Exams Begin
December 21	M	Final Exams End
December 23	W	Final Grades Due

## Course Outline

Week	Date	Topic	Assignment	Reading
1	T, 9/1	<u>Microorganisms and Environmental Microbiology (I)</u> Introduction to environmental microbiology, importance of microorganisms, classification of microorganisms, bacteria.	HW1	Ch. 1, 2.1, 2.2.1-2.2.6
2	T, 9/8	<b>NO CLASS</b> (Monday Classes Meet)		
3	T, 9/15	<u>Microorganisms and Environmental Microbiology (II)</u> Archaea, fungi, protozoa, virus and other biological entities.	HW2	Ch. 2.2.9, 2.3, 2.4, 2.5
4	T, 9/22	<u>Microbial Growth</u> Bacterial growth in batch and continuous culture, Monod kinetics, microbial growth in environment.	HW3	Ch. 3.1-3.3
5	T, 9/29	<u>Microbial Metabolism</u> Carbon and energy source, metabolic diversity, photosynthesis, respiration, fermentation, primary and secondary production.	HW4	Ch. 2.2.8, 3.4, 6.3
6	T, 10/6	<u>Conventional Cultural and Physiological Methods</u> Extraction and isolation techniques, plating and other cultural methods, measuring microbial activities in pure culture, carbon respiration, isotopic and radiolabeled tracers.	HW5	Ch. 10, 11

7	T, 10/13	<u>Microbial Genetics</u> Genomics (chromosome and plasmid), genetic information transfer, antibiotic resistance.	HW6	Ch. 2.2.7, 13.1, 13.6, 21. 2, 31.4
8	T, 10/20	<b>MIDTERM EXAM</b>		
9	T, 10/27	<u>Advanced Molecular Tools</u> DNA extraction method, hybridization-based and amplification-based assays, DNA fingerprinting, sequencing analysis, bioinformatics and omic approaches for characterization of environmental microorganisms.	HW7, term paper out	Ch. 13, 21
10	T, 11/3	<u>Microbial Environments (I): Soil</u> Earth environments, soil zones and phases, biotic and abiotic stresses, major microbial groups.	HW8	Ch. 4.1-4.4
11	T, 11/10	<u>Microbial Environments (II): Water</u> Physical and chemical characteristics, planktonic and benthic microbes, biofilm and microbial mats, freshwater environments.	HW9	Ch. 6.1, 6.2, 6.5
12	T, 11/17	<u>Microbial Environments (III): Air</u> Aeromicrobiology, aerosols and bioaerosols, aeromicrobiological pathways, microbial survival in the air.	HW10	Ch. 5.1-5.5
13	T, 11/24	<u>Biogeochemical Cycling</u> C/N/S cycling, microbial induced corrosion.	HW11	Ch. 16.1-16.4
14	T, 12/1	<u>Biodegradation and Bioremediation</u> Overall process of biodegradation, contaminant structure, toxicity and biodegradability, environmental factors affecting biodegradation, biodegradation of organic pollutants, bioremediation techniques.	HW12, term paper due	Ch. 17
15	T, 12/8	<b>FINAL EXAM</b>		

PLEASE NOTE: THIS SYLLABUS, INCLUDING THE SCHEDULE, IS SUBJECT TO CHANGE BASED ON MATERIAL COVERED AND OTHER FACTORS. ANY CHANGES ARE AT THE DISCRETION OF THE INSTRUCTOR AND/OR DEPARTMENT, AND WILL BE COMMUNICATED AS SOON AS POSSIBLE TO ALL STUDENTS.

*Updated by Genti' Price - August, 2020  
Department of Chemistry & Environmental Sciences (CES)  
Course Syllabus, Fall 2020*