

SYLLABUS
CEE 361-2 PUBLIC AND ENVIRONMENTAL HEALTH
Winter Quarter 2023

DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING
Technological Institute
Northwestern University, Evanston IL

INSTRUCTOR:

Luisa Marcelino, A330 Technological Institute, Phone: (847) 491-4035
e-mail: l-marcelino@northwestern.edu (BEST)

CLASS: T Th 11:00 AM – 12:20PM

OFFICE HOURS: T 12:30 -2:00PM

PREREQUISITES: CEE 361-1 (Environmental Microbiology) or equivalent background in microbiology and/or biology and/or chemistry/ biochemistry.

COURSE DESCRIPTION:

This course explores current problems in public and environmental health, such as the worldwide burden of major infectious diseases; the emergence and re-emergence of new pathogens, epidemiology, prevention, diagnostics and treatment of major diseases, environmental reservoirs of infectious organisms, transport of microorganisms in the environment, and evaluation of the combined effects of land use modification, water abstraction, and global climate change on ecosystems.

LEARNING OBJECTIVES

By the end of this course, students should be able to...

1. Discuss major infectious diseases, epidemiology, treatment and environmental transmission and current limitations in controlling/ eradicating disease, with special focus on the ongoing SARS-CoV-2/ COVID-19 pandemic.
2. Evaluate the major technological breakthroughs that have successfully been used to prevent the spread of infectious diseases, including vaccination, social public health programs, effective surveillance and outbreak management schemes, drinking water treatment, and sanitation.
3. Develop a conceptual model of the causes of disease emergence and re-emergence, including both purely biological factors (e.g., mutation) and factors related to human population growth and dynamics, human perturbations on the structure and function of natural ecosystems, and global climate change.
4. Propose sustainable solutions to major health challenges, within the framework of the Sustainable Developmental Goals and with special focus on COVID-19: 1) improve existent vaccines and develop new vaccines; 2) control insects that transmit agents of disease; 3) improve drug treatment of infectious diseases 4) cure latent and chronic infections; 5) measure disease and health status accurately and economically.
5. Develop critical thinking and communication skills through execution of group projects and oral presentation and discussion of a final project.

TEACHING METHOD: Two (1h 20m) lecture periods per week, case-study discussions and individual final project, no laboratory, with hybrid classes.

EVALUATION METHOD: An overall course grade will be calculated from scores using the scheme below:

- Three case-study presentations/ discussions (36%)
- Final project (paper and in-class presentation with Q&A) (55%)
- Participation in other groups' final projects (9%)

Please see detailed grading rubric about grading in class case-study presentations/discussion and final project.

TEXTBOOK: Brock Biology of Microorganisms, Madigan and Martinko

- Brock Biology of Microorganisms, Madigan, Bender, Buckley, Sattley and Stahl, 16th ed 2021 (or 15th ed, 2018) Pearson Benjamin Cummings, San Francisco
- Peer-reviewed articles for in class discussion of case studies (provided with each assignment)

Accessibility

Northwestern University is committed to providing the most accessible learning environment as possible for students with disabilities. Should you anticipate or experience disability-related barriers in the academic setting, please contact AccessibleNU to move forward with the university's established accommodation process (e: accessiblenu@northwestern.edu; p: 847-467-5530). If you already have established accommodations with AccessibleNU, please let me know as soon as possible, preferably within the first two weeks of the term, so we can work together to implement your disability accommodations. Disability information, including academic accommodations, is confidential under the Family Educational Rights and Privacy Act. granted for that specific assignment. For details regarding academic integrity at Northwestern or to download the guide, visit: <https://www.northwestern.edu/provost/policies/academic-integrity/index.html>

Academic Integrity

Student-teacher relationships are built on trust. Acts, which violate this trust, undermine the educational process. Students in this course are required to comply with the policies found in the booklet, "Academic Integrity at Northwestern University: A Basic Guide". All work submitted for credit in this course must be submitted electronically unless otherwise instructed. Your written work may be tested for plagiarized content. Submission of any assignment that is in violation of this policy will result in zero points. For details regarding academic integrity at Northwestern or to download the guide, visit: <https://www.northwestern.edu/provost/policies/academic-integrity/index.html>

Prohibition of Recording Classes by Students

Unauthorized student recording of classroom or other academic activities (including advising sessions or office hours) is prohibited. Unauthorized recording is unethical and may also be a violation of university policy and state law. Students requesting the use of assistive technology as an accommodation should contact [AccessibleNU](#). Unauthorized use of classroom recordings – including distributing or posting them – is also prohibited. Under the University's [Copyright Policy](#), faculty own the copyright to instructional materials – including those resources created specifically for the purposes of instruction, such as syllabi, lectures and lecture notes, and presentations. Students cannot copy, reproduce, display, or distribute these materials. Students who engage in unauthorized recording, unauthorized use of a recording, or unauthorized distribution of instructional materials will be referred to the appropriate University office for follow-up.

SCHEDULE: There might be slight modifications, depending on class size & pace, need to review lecture material, etc.

Lectures schedule for CIV_ENG 361- 2 Public and Environmental Health, Winter Quarter 2023

| Lecture | Date | Subjects to cover |
|---------|-----------------------|---|
| -- | Thurs 1/05/23 | <i>Students will work in groups to produce a written doc on a COVID-19 topic as their final project. Each group will select their top 3 topics from the list posted onto CANVAS, or may propose their own. They will write a paragraph for each topic briefly explaining how they will approach it.</i> |
| 1 | Thurs 1/05/23 | Intro to the course, goals, organization, discussion of term project and overview of the topics addressed in the course. Public Health and Global Health Challenges. Brock 16th ed, Chapters 1 & 2. Global Health action plan (Millennium Developmental Goals -2001 to 2015 plan- and Sustainable Developmental Goals - 2016 to 2030 plan). |
| 2 | Tues 1/10/23 | Introduction to Microbial Pathogenesis- i.e., what makes a microbe capable of causing disease? Brock 16 th ed, Chapters 1; 2.I through 2.III; 3.I; 4.I through 4.III and 4.V; and 25. |
| 3 | Thurs 1/12/23 | Host defense mechanisms- physical barriers and immune system (Innate and adaptive immunity) Brock 16 th ed, Chapters 26 and 27. |
| -- | Fri 1/13/23 | <i>Final topics are assigned to each group by the instructor, who will ensure that there is a good mix of topics, and they link well together.</i> |
| 4 | Tues 1/17/23 | Concepts of epidemiology and public health (John Snow and Cholera). Infectious diseases: clinical symptoms, epidemiology, treatment, global surveillance and challenges in eradicating major diseases. Brock 16 th ed, Chapter 30. |
| 5 | Thurs 1/19/23 | Health status of populations, modeling the dynamics of infection. Modes of disease transmission, major stages in disease process, surveillance, and immunization. Interpreting graphic and tabular data; trends, controls, variation, and uncertainty in measurements. Global Burden of Disease Study. Correlation between countries' socio-(economic)- demographic development & burden of disease. Readings posted onto Canvas. |
| -- | W-T, 1/18– 1/19 | <i>Groups meet in-person with instructor outside classroom time to discuss their outline (~20 min meetings). All members of each group must be present for the meeting and be prepared to discuss the outline</i> |
| 6 | Tues 1/24/23 | Diagnostic methods, antimicrobial control, artificial immunization (e.g. vaccines), and antimicrobial resistance. Brock 16 th ed, Chapter 29 and 28.II and 28.III. |
| 7 | Thurs 1/26/23 | Case study 1- Upper and lower respiratory infections: Flu, Colds, and SARS. Brock 16 th ed, Chapter 31.7, 31.8 and 28.6. Additional readings will be posted as part of the assignment. |
| -- | Fri 1/27/23 | Submission of final write-ups for case study 1, presenting group posts summary of answers. |
| -- | Fri, 1/27/23 | <i>Each group submits a detailed outline of their topic of choice with 3 focus questions and a summary plan (~ 500 words max). Cite 4-6 references of relevant peer-reviewed studies or reports. Students need to read all outlines to familiarize themselves with each topic and provide meaningful and respectful questions/ comments during presentations.</i> |
| -- | Tues 1/31/23 | <i>Instructor provides feedback to the outline; students incorporate it into their presentations.</i> |
| 8 | Tues 1/31/23 | Global health technologies in resource-poor countries- COVID-19 rapid diagnostics test (Prof. Matt Glucksberg, Director of Center for Innovation in Global Health Technologies BME/NU). |
| 9 | Thurs 2/02/23 | Group presentations of outline topics on COVID-19. Each group will present and answer questions on their topic for 20 minutes. Students are encouraged to provide meaningful and respectful comments on two different topics (may earn up to 3% of grade). |

| Lecture | Date | Subjects to cover |
|---------|---------------------|---|
| 10 | Tues 2/07/23 | Emerging and re-emerging infectious diseases. HIV/ AIDS (Brock 16 th ed, Chapt 31.14 and 28.6). Tuberculosis (Brock 16 th 3e, 29- Microbiol NOW, 31.1 and 31.4), multiple & extreme drug resistant TB forms. |
| -- | Tue 2/07/23 | <i>Students submit 1st draft (it should include the sections as close to final as possible – see detailed description of the final project assignment on Canvas)</i> |
| 11 | Thurs 2/09/23 | Human microbiome and health (Dr. Na Fei, Postdoctoral fellow in Prof. Eugene Chang's lab U of Chicago) |
| -- | Fri 2/10/23 | Instructor submits revisions of 1 st draft, revisions should be incorporated into presentations. |
| | Mo 2/14/22 | Groups submit revised 1 st draft, so all students can read them before in-class discussion |
| 12 | Tues 2/14/23 | Case study 2- Human Microbiome and Human Health. Readings will be posted as part of the assignment. |
| 13 | Thurs 2/16/23 | Group presentations of 1 st draft on their COVID-19 topics. Each group will present and answer questions on their topic for 15 minutes. Each student is encouraged to provide meaningful and respectful comments on two different topics (may earn up to 3% of grade). |
| -- | Fri 2/17/23 | Submission of final write-ups for case study 2, presenting group posts summary of answers. |
| 14 | Tue 2/21/23 | Complexity of ecosystems and microbial habitats: Cholera (Brock 16 th ed, Chapters 33.1 and 33.3) and Malaria- clinical symptoms, epidemiology, and mechanisms of disease transmission. Brock 16 th ed, Chapter 34.5 and readings posted on Canvas |
| 15 | Thurs 2/23/23 | Clinical management of COVID-19 and COVID-19 vaccines (Dr. Shannon Galvin, MD, Director of Clinical Programs & Training, Center for Global Health). |
| 16 | Tue 2/28/23 | NO CLASS. Recommend that you watch " Epidemics That Changed Human History " by Prof. Vadim Backman, Biomedical Engineering, NU (67 min) |
| -- | Sun 2/26/23 | <i>Students submit 2nd draft (close to final draft; the students will have to address questions posed during oral presentations and feedback that may be provided by the instructor)</i> |
| 17 | Thurs 3/02/23 | Case Study 3- Persistence and transmission of microorganisms in the environment: SARS-CoV-2 wastewater surveillance and risk assessment |
| -- | Sun 3/05/23 | Instructor submits revisions of 2 nd draft, revisions should be incorporated into presentations. |
| -- | Mo 3/06/23 | Submission of final write-ups for case study 3, presenting group posts summary of answers. |
| 18 | Tue 3/07/23 | Group presentations of their COVID19 topic (final draft). Each group will present for 18 min + Q&A 6 min. Students are encouraged to provide meaningful and respectful questions/ comments on two different topics (may earn up to 3% of grade). |
| -- | Tue 3/08/22 | <i>Students submit updated 2nd draft so all students may read and comment before group presentations</i> |
| 19 | Thursday 3/09/23 | Group presentations of their COVID19 topic (final draft). Each group will present for 18 min + Q&A 6 min. Students are encouraged to provide meaningful and respectful questions/ comments on three different topics (may earn up to 3% of grade). |
| -- | Mo 3/13/23 | All groups submit their final slide deck with notes and their final paper by 12PM (which should include all updates and address questions raised during the presentation and revisions of the drafts). |

Black text – Lecture information

Blue text – deadlines for final project

Green text – deadlines for case studies

Class Modality

Class sessions for this course will occur in a hybrid format with some lectures in-person and other over zoom. Individual students will not be granted permission to attend remotely except as the result of an Americans with Disabilities Act (ADA) accommodation as determined by AccessibleNU.

Maintaining the health of the community remains our priority. If you are experiencing any symptoms of COVID do not attend class and update your Symptom Tracker application right away to connect with Northwestern's Case Management Team for guidance on next steps. Also contact the instructor as soon as possible to arrange to complete coursework. Students who experience a personal emergency should contact the instructor as soon as possible to arrange to complete coursework. Should public health recommendations prevent in person class from being held on a given day, the instructor or the university will notify students.

COVID-19 Classroom Expectations Statement

Students, faculty, and staff must comply with University expectations regarding appropriate classroom behavior, including those outlined below and in the [COVID-19 Code of Conduct](#). With respect to classroom procedures, this includes:

- *Policies regarding masking and social distancing evolve as the public health situation changes. Students are responsible for understanding and complying with current masking, testing, Symptom Tracking, and social distancing requirements.*
- *In some classes, masking and/or social distancing may be required as a result of an Americans with Disabilities Act (ADA) accommodation for the instructor or a student in the class even when not generally required on campus. In such cases, the instructor will notify the class.*
- *No food is allowed inside classrooms. Drinks are permitted, but please keep your face covering on and use a straw.*
- *Faculty may assign seats in some classes to help facilitate contact tracing in the event that a student tests positive for COVID-19. Students must sit in their assigned seats.*

If a student fails to comply with the [COVID-19 Code of Conduct](#) or other University expectations related to COVID-19, the instructor may ask the student to leave the class. The instructor is asked to report the incident to the Office of Community Standards for additional follow-up.

COVID-19 Testing Compliance Statement

To protect the health of our community, Northwestern University requires unvaccinated students who are in on-campus programs to be tested for COVID-19 twice per week.

Students who fail to comply with current or future COVID-19 testing protocols will be referred to the Office of Community standards to face disciplinary action, including escalation up to restriction from campus and suspension.

Class Recordings

This class or portions of this class might be recorded by the instructor for educational purpose and available to the class during the quarter. Your instructor will communicate how you can access the recordings. Portions of the course that contain images, questions or commentary/discussion by students will be edited out of any recordings that are saved beyond the current term.

Support for Wellness and Mental Health

Northwestern University is committed to supporting the wellness of our students. Student Affairs has multiple resources to support student wellness and mental health. If you are feeling distressed or overwhelmed, please reach out for help. Students can access confidential resources through the Counseling and Psychological Services (CAPS), Religious and Spiritual Life (RSL) and the Center for Awareness, Response and Education (CARE). Additional information on all of the resources mentioned above can be found here:

<https://www.northwestern.edu/counseling/>

<https://www.northwestern.edu/religious-life/>

<https://www.northwestern.edu/care/>

Additional resources at NU

[Academic Support and Learning Advancement Office](#) at Northwestern. This office has adapted study groups, tutoring resources, and academic support to serve students in our COVID-19 world.