THE OHIO STATE UNIVERSITY
COLLEGE OF PUBLIC HEALTH

PUBHEHS 7365 – Environmental and Human Health Risk Assessment
3 credits – Spring, 2026
Class Day/Time: Tuesdays and Thursdays, 12:45-2:05 pm
Location: Room A103, Physical Activity and Education Services (PAES) Building

Course Instructor

Olorunfemi Adetona, PhD Toxicology, University of Georgia, 2011
436 Cunz Hall, 1841 Neil Avenue
Columbus, OH 43210
Phone number: 614-247-8123
Email address: adetona.1@osu.edu

Instructor's Office Hours

Mondays at 12-1 pm

Faculty Feedback & Response Time:

The following gives you an idea of my intended availability during the course:

- **Grading:** You can generally expect feedback within 7 days.
- **E-mail:** I will reply to e-mails (OSU email preferred or alternatively via Carmen) within 48 hours on school days.
- **Discussion board:** Either the TA or the instructor will check and reply to assignment postings to the discussion boards within 7 days.

Graduate Teaching Assistant (GTA)

Anthony Akande
Email address: akande.16@osu.edu
Office Hours: Thursdays at 2-3 pm – the use of instructor office hours is recommended. TA office hours should be utilized following advisement by the instructor or in case instructor is unable to meet.
Location: please email the TA to set up a Zoom meeting if the TA office hours is needed.

GTA Responsibilities

The GTA assigned to the course will hold office hours as needed for any students who need help with class material. The TA may assist with scoring assignments; however, final grades will be assigned by the professor. **Any questions regarding grading should be directed to the professor and not the TA.**

Course Description

Risk assessment is a framework for evaluating scientific information for the assessment of nature and probability of adverse effects of exposures to toxic agents in human and ecological receptors. Risk assessment is used to inform policy decisions and is the scientific basis for environmental regulations in the United States. The *Environmental and Human Health Risk Assessment* course is designed to provide students with a working knowledge of the risk assessment process and an appreciation of the underlying science. Students will learn about the development of the formal risk assessment process, its role in environmental and public health regulation in the United States, and the four fundamental steps in a risk assessment (hazard identification, toxicity assessment, exposure assessment, and risk characterization) during the first half of the course. Students will learn about the interface between the risk assessment and

risk management process and will be introduced to special risk assessment topics including ecological risk assessment and cumulative risk assessment during the second half of the course. Students will be introduced to various federal risk assessment resources and will be offered the opportunity to work through the risk assessment process using these resources and available data in class based on case studies that are focused on current topics and on group course projects.

The content of the course necessarily reinforces the impact of environmental interactions on human health. The characterization of exposure to toxic agents is a necessary step for quantifying the risk of resulting adverse effects in human receptors. Risk assessment requires a comprehensive knowledge of the release of toxic agents, their distribution and fate within the environment, and their interactions with biological targets. As a formal framework that was developed to assess risks to human health, risk assessment is a useful tool for informing decisions related to controls to reduce environmental exposures. Consequently, the conduct of risk assessment requires knowledge of the exposure continuum from source to disease, and it is an integral part of the societal response to address exposures to environmental contaminants.

Prerequisites

There are no pre-requisites for this course. Undergraduate students need permission of the instructor to enroll in the course.

Course Learning Objectives

1. Describe the role of risk assessment at the interface of science and public health policy, and the historical development of the formal risk assessment process as the basis for environmental and public health regulation.
2. Describe the fundamental steps of the human health and ecological risk assessment processes.
3. Use available resources and guidance documents for conducting human health risk assessment and ecological risk assessment.
4. Apply knowledge from different disciplines such as Toxicology, Epidemiology, Exposure Science and Statistics inform the development and conduct of risk assessment.
5. Conduct a simple screening level risk assessment and calculations necessary for risk characterization.
6. Critically review a human health risk assessment.
7. Describe and apply current and likely future developments in human health risk assessment.

Competencies:

Applicable MPH Degree Foundational Public Health Competencies

2. Select the quantitative and qualitative data collection methods appropriate for a given public health context
3. Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate
4. Interpret results of data analysis for public health research, policy or practice
19. Communicate audience-appropriate public health content, both in writing and through oral presentation

Applicable MPH EHS Specialization Competencies

Upon completion of the course, MPH degree students with specialization in environmental health sciences should also be able to:

1. Outline the health challenges that natural and anthropogenic contaminants in the environment can pose to population health.
2. Explain the physiological factors that influence human exposure and the uptake of chemical and biological environmental agents.
4. Access state, federal, and local resources for assessing the environmental and occupational health.

5. Determine the role of exposure assessment in environmental and occupational health.

Applicable MS Competencies

Upon completion of the course, MS students should also be able to:

5. Communicate in writing and orally a research project's methods, results, limitations, conclusions and public health relevance.
6. Explain individual and community susceptibility and vulnerability factors that heighten the risk for populations for adverse health outcomes from environmental hazards.
7. Apply the environmental health paradigm (i.e. EHS model) to characterizing hazardous physical, chemical and biological agents relative to sources, categories, exposure matrices/pathways, distribution, human exposures, responses, societal/regulatory actions, and technological controls.

Applicable PhD Competencies

Upon completion of the course, MS students should also be able to:

6. Communicate in writing and orally a research project's purpose, methods, results, limitations, conclusions and public health relevance to both informed and lay audiences.
7. Quantify individual and community susceptibility and vulnerability factors that heighten the risk for populations for adverse health outcomes from environmental hazards.
8. Apply the environmental health paradigm (i.e. EHS model) to characterizing hazardous physical, chemical and biological agents relative to sources, categories, exposure matrices/pathways, distribution, human exposures, responses, societal/regulatory actions, and technological controls.

A complete list of College of Public Health Competencies is located on the College of Public Health website: https://cph.osu.edu/students/competencies.

Text/Readings:

The textbooks that have readings for this course are listed below. The chapters to be read in each textbook are outlined in the course schedule at the end of the syllabus. These textbooks are available electronically for free at OSU Libraries.

*The electronic copies of the **first two listed textbooks** can be more easily accessed by entering the textbook title and author into the search box at OSU Libraries. Clicking on the textbook search result will prompt you to enter your OSU login credentials to access the textbook.*

*Furthermore, specific instructions on how to gain access at OSU Libraries to the **third listed textbook** are provided in applicable Carmen modules.*

All other reading materials are posted in the module corresponding to their class session and topic on the course Carmen website. A document with links to the HTML of journal article readings are also provided where applicable and helpful.

1. Risk Assessment for Environmental Health. 2023 Eds: Robson MG et al. CRC Press, Boca Raton, FL.
2. Toxicological Risk Assessment for Beginners. 2015. Eds: Torres JA and Bobst S. Springer, New York, NY.
3. Casarette and Doull's Toxicology: Basic Science of Poisons, 9th Edition. 2019. Eds: Klassen C. McGraw Hill Education, New York.

Carmen

There is a Carmen site for this course: https://carmen.osu.edu. All course materials are available via Carmen.

You will need to use BuckeyePass (buckeyepass.osu.edu) multi-factor authentication to access your courses in Carmen. To ensure that you are able to connect to Carmen at all times, it is recommended that you take the following steps:

- Register multiple devices in case something happens to your primary device. Visit the BuckeyePass - Adding a Device help article for step-by-step instructions (https://admin.resources.osu.edu/buckeyepass/adding-a-device)
- Request passcodes to keep as a backup authentication option. When you see the Duo login screen on your computer, click **Enter a Passcode** and then click the **Text me new codes** button that appears. This will text you ten passcodes good for 365 days that can each be used once.
- Download the Duo Mobile application (https://admin.resources.osu.edu/buckeyepass/installing-the-duo-mobile-application) to all of your registered devices for the ability to generate one-time codes in the event that you lose cell, data, or Wi-Fi service

If none of these options will meet the needs of your situation, you can contact the IT Service Desk at 614-688-4357(HELP) and IT support staff will work out a solution with you.

Class Format: How this course works

- **Mode of delivery:** This course will meet during the Spring 2026 semester every Tuesday and Thursdays at 12:45-2:05 pm except when otherwise specified in the syllabus.
- **Credit hours and work expectations:** This is a **3-credit-hour course**. According to Ohio State policy (go.osu.edu/credithours), students should expect around 3 hours per week of time spent on direct instruction (e.g., for didactic lectures, discussions, and solving case study questions) in addition to 6 hours of homework/active learning activities (e.g., assigned readings, homework assignments, discussion board postings, and group project) to receive a grade of (C) average.
- **Attendance and participation requirements:** You are expected to attend every class for the in-person lecture. If you have a situation that might cause you to miss a class, please discuss it with me *as soon as possible.*

Course Technology

Technology skills needed for this course

- Basic computer and web-browsing skills
- Navigating Carmen (go.osu.edu/canvasstudent)
- CarmenZoom virtual meetings (go.osu.edu/zoom-meetings)

Required equipment

- **Computer:** current Mac (Mac OSX) or PC (Windows 10+) with high-speed internet connection
- **Calculator:** Students should have access to a scientific calculator that can perform basic arithmetic, square roots, logarithms, and exponentiation.
- **Other:** a mobile device (smartphone or tablet) to use for BuckeyePass authentication

Optional equipment (for participation in optional live office hours and/or review sessions)

- **Webcam:** built-in or external webcam, fully installed and tested
- **Microphone:** built-in laptop or tablet mic or external microphone

Required software

- **Microsoft 365 Copilot (formerly Office 365)**
  All Ohio State students are now eligible for free Microsoft 365 Copilot (formerly Office 365). Full instructions can be found at go.osu.edu/office365help.

Technology support

For help with your password, university email, Carmen, or any other technology issues, questions, or requests, contact the Ohio State IT Service Desk. Standard support hours are available at and support for urgent issues is available 24/7.

- **Self-Service and Chat support:** http://it.osu.edu/help
- **Phone:** 614-688-4357(HELP)
- **Email:** servicedesk@osu.edu

Assignments/Assessments

Exams: 35%
The **mid-term (12%) and final (23%) exams** will be online with the *Lockdown Browser* feature, closed book and will be made available online at the times/dates shown on the class schedule. Questions will include multiple choice and short essays/problems. Students are encouraged to take the exams on the dates and times that they are given. **Make-up exams** will only be given if the instructor is informed about an inability to take exams on the scheduled dates at least 48 hours before the exam. Otherwise, allowance will only be given in case of personal emergencies or *extenuating* circumstance (e.g., unforeseen medical issues, death in the family, loss of internet access etc.) that will preclude the student from informing the professor about the inability to take the exam on the scheduled date. Students are expected to work independently and not consult with anyone or resources (including generative AI) to complete the exams.

Mini Quizzes: 35%
Three **mini-quizzes** will be online with the *Lockdown Browser* feature, closed book and will be made available online at the times/dates shown on the class schedule. Questions will include multiple choice and short essays/problems. Students are encouraged to take the quizzes on the dates and times that they are given. **Make-up quizzes** will only be given if the instructor is informed about an inability to take exams on the scheduled dates at least 48 hours before the exam. Otherwise, allowance will only be given in case of personal emergencies or *extenuating* circumstance (e.g., unforeseen medical issues, death in the family, loss of internet access etc.) that will preclude the student from informing the professor about the inability to take the exam on the scheduled date. Students are expected to work independently and not consult with anyone or resources (including generative AI) to complete the exams.

Homework Assignments: 10%
Three homework assignments will be assigned during the course. The first, second, and third homework assignments are worth 3%, 4%, and 3% of the final grade in the course, respectively. The assignments will involve literature search for information that is applicable to risk assessment for various chemicals, conceptualization of exposure, data relevant to risk assessment and their sources, and computations in the toxicity assessment steps of risk assessment. Students will work on the first two assignments in their assigned groups while they will individually and independently complete the third. Students can use course materials and online (but not generative AI) resources in completing the assignments. **In the case of excused absences, students will be provided with an opportunity to make up missed assignments as is feasible.** Approval of an extension for an assignment is at the discretion of the instructor and will be based on the merit of the request. Otherwise, **assignments that are completed and submitted late** will incur a 20% penalty for each day it is late. After the penalty period (i.e. when submitting the assignment will incur a score of zero – 5 days after it is due), the assignment will not be accepted.

Reflection/Discussion Board Activities: 10%
Some readings highlighted **in red font** in the course schedule below will form the basis of outside class activities including the development of questions based on readings and discussion board postings, and in-class discussions or exercises. **Each course group will lead discussions** based on assigned readings on **two Thursdays** during the semester as specified in the course schedule below **in green font**. Members of the group that is assigned to lead a discussion are required to submit **six questions** related to the reading by **5 pm on the day (Wednesday) before the class** where the readings will be discussed. **Two** of the questions will be chosen by the instructor to be posted on the discussion board in CARMEN for comments from the class. The others can be used by the group as part of the questions to lead in-class discussion. **Two instructor-led discussions** based on readings will also be conducted. The instructor will post questions for response on the discussion board for the **first** instructor-led discussion. **Responses to discussion board**

posts will be due by 11:59 pm on the following Tuesday. Submission of group questions and discussion board responses are worth 3% and 7% of the final grade, respectively. The rubric for grading this activity is provided in the assignment prompt on the course Carmen website. **Non-submission of discussion questions** by a group by the due date will result in a score of zero for that group. **The policy for late response** to discussion board post is as outlined for homework assignments above.

In-Class Participation: 10%
Full attendance, except in the case of excused absences or extenuating circumstances, is a course requirement. Students should notify the instructor when they are not able to attend due to extenuating circumstances. Attendance and active participation (including engaging in discussions, asking questions, contributions to in-class practice exercises) are each worth 5% of the final grade. Participation during class sessions will be monitored by the instructor and actively participating in at least 80% of class sessions will earn full marks.

Group Project: 25%
Students will be assigned to a group of two to four to conduct a mock chemical risk assessment on an assigned or self-chosen chemical based on an exposure scenario that they will identify. Details about the group project are provided in the assignment prompt on the course Carmen website. Students will submit a report of the mock risk assessment and give a presentation about the group project at the final class meeting of the semester. The report and presentation are worth 20% and 5% of the final grade, respectively. The rubric for grading this activity is provided in the assignment prompt on the course Carmen website.

Grading
All evaluation activities (exams, quizzes, homework assignments, discussion board, in-class participation, and group project work) are weighted equally and will contribute the percentages outlined above to the final scores. The final assigned grades for the course are as outlined below.

Grading Scale

A	**93 to 100**	Outstanding work that reflects mastery of the material and the ability to apply it
A-	**90 to <93**	Excellent work that reflects mastery of the material
B+	**87 to <90**	Good work that reflects mastery of most of the material
B	**83 to <87**	Good work that reflects mastery of some of the material
B-	**80 to <83**	Good work that reflects mastery of a few aspects of the material
C+	**77 to <80**	Mediocre work that reflects familiarity with, but not mastery of the material
C	**73 to <77**	Mediocre work that reflects familiarity with most of the material
C-	**70 to <73**	Mediocre work that reflects little familiarity with the material
D+	**67 to <70**	
D	**60 to <67**	
E	**Below 60**	

Class Policies
Full attendance is a course requirement except in the case of excused absence or extenuating circumstances. Students should notify the instructor of any absence due to extenuating circumstances. The use of electronic devices (e.g., cell phones, computers, and pagers etc.) in class is discouraged except for course-related activity. Uploading of course materials to any online learning or exam preparation platform/tool (e.g., Quizlet, Chegg, etc.) is forbidden. Please consult the Assignment/Assessment section above for policies about exams and other course assessment activities.

Copyright Statement

This syllabus and all course materials (e.g., homework assignments, solution keys, course materials) are under copyright by the instructor and cannot be posted elsewhere without written permission.

Generative AI Policy

Given that the learning goals of this class are to learn and independently demonstrate the application of the concept of health risk assessment and build your awareness about ethics surrounding the communication of science and scientific research, the use of generative artificial intelligence (GenAI) tools such as Copilot, Gemini, or ChatGPT, writers or quiz aids like Grammarly or Black Tom AI, or translation platforms such as Google Translate is not permitted in this course except when specifically instructed by the instructor. Any use of GenAI tools for work in this class, outside of being instructed and guided to do so by the instructor, may therefore be considered a violation of Ohio State's Academic Integrity(opens in new window) policy and Code of Student Conduct(opens in new window) because the work is not your own. If I suspect that you have used GenAI on an assignment for this course, I will ask you to explain your process for completing the assignment in question. The unauthorized use of GenAI tools will result in referral to the Committee on Academic Misconduct(opens in new window).Include a statement about whether students are permitted or not permitted.

Office of Student Life: Disability Services

The university strives to maintain a healthy and accessible environment to support student learning in and out of the classroom. If you anticipate or experience academic barriers based on your disability (including mental health, chronic, or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion.

If you are ill and need to miss class, including if you are staying home and away from others while experiencing symptoms of a viral infection or fever, please let me know immediately. In cases where illness interacts with an underlying medical condition, please consult with Student Life Disability Services to request reasonable accommodations. You can connect with them at slds@osu.edu; 614-292-3307; or slds.osu.edu.

Mental Health Services

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting ccs.osu.edu or calling 614-292-5766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on call counselor when CCS is closed at 614-292-5766 and 24 hour emergency help is also available 24/7 by dialing 988 to reach the Suicide and Crisis Lifeline.

Religious Beliefs or Practices Accommodations

Ohio State has had a longstanding practice of making reasonable academic accommodations for students' religious beliefs and practices in accordance with applicable law. In 2023, Ohio State updated its practice to

align with new state legislation. Under this new provision, students must be in early communication with their instructors regarding any known accommodation requests for religious beliefs and practices, providing notice of specific dates for which they request alternative accommodations within 14 days after the first instructional day of the course. Instructors in turn shall not question the sincerity of a student's religious or spiritual belief system in reviewing such requests and shall keep requests for accommodations confidential.

With sufficient notice, instructors will provide students with reasonable alternative accommodations with regard to examinations and other academic requirements with respect to students' sincerely held religious beliefs and practices by allowing up to three absences each semester for the student to attend or participate in religious activities. Examples of religious accommodations can include, but are not limited to, rescheduling an exam, altering the time of a student's presentation, allowing make-up assignments to substitute for missed class work, or flexibility in due dates or research responsibilities. If concerns arise about a requested accommodation, instructors are to consult their tenure initiating unit head for assistance.

A student's request for time off shall be provided if the student's sincerely held religious belief or practice severely affects the student's ability to take an exam or meet an academic requirement and the student has notified their instructor, in writing during the first 14 days after the course begins, of the date of each absence. Although students are required to provide notice within the first 14 days after a course begins, instructors are strongly encouraged to work with the student to provide a reasonable accommodation if a request is made outside the notice period. A student may not be penalized for an absence approved under this policy.

If students have questions or disputes related to academic accommodations, they should contact their course instructor, and then their department or college office. For questions or to report discrimination or harassment based on religion, individuals should contact the Civil Rights Compliance Office. (Policy: Religious Holidays, Holy Days and Observances)

Academic Misconduct

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term “academic misconduct” includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-48.7 (B)). For additional information, see the Code of Student Conduct.

Intellectual Diversity

Ohio State is committed to fostering a culture of open inquiry and intellectual diversity within the classroom. This course will cover a range of information and may include discussions or debates about controversial issues, beliefs, or policies. Any such discussions and debates are intended to support understanding of the approved curriculum and relevant course objectives rather than promote any specific point of view. Students will be assessed on principles applicable to the field of study and the content covered in the course. Preparing students for citizenship includes helping them develop critical thinking skills that will allow them to reach their own conclusions regarding complex or controversial matters.

Grievances and Solving Problems

A student who encounters a problem related to his/her educational program has a variety of avenues available to seek resolution. According to University Policies, if you have a problem with this class, you should seek to resolve the grievance concerning a grade or academic practice by speaking first with the

instructor or professor. Then, if necessary, you may take your case to the department chairperson. Specific procedures are outlined in Faculty Rule 3335-8-23, the CPH Graduate Student Handbook, and the CPH Undergraduate Student Handbook. Grievances against graduate, research, and teaching assistants should be submitted first to the supervising instructor, then to the chairperson of the assistant's department.

Creating an Environment Free from Harassment, Discrimination, and Sexual Misconduct
The Ohio State University is committed to building and maintaining a community to reflect diversity and to improve opportunities for all. All Buckeyes have the right to be free from harassment, discrimination, and sexual misconduct. Ohio State does not discriminate on the basis of age, ancestry, color, disability, ethnicity, gender, gender identity or expression, genetic information, HIV/AIDS status, military status, national origin, pregnancy (childbirth, false pregnancy, termination of pregnancy, or recovery therefrom), race, religion, sex, sexual orientation, or protected veteran status, or any other bases under the law, in its activities, academic programs, admission, and employment. Members of the university community also have the right to be free from all forms of sexual misconduct: sexual harassment, sexual assault, relationship violence, stalking, and sexual exploitation.

To report harassment, discrimination, sexual misconduct, or retaliation and/or seek confidential and non-confidential resources and supportive measures, contact the Civil Rights Compliance Office:

Online reporting form at http://civilrights.osu.edu/,
Call 614-247-5838 or TTY 614-688-8605,
Or Email civilrights@osu.edu

The university is committed to stopping sexual misconduct, preventing its recurrence, eliminating any hostile environment, and remedying its discriminatory effects. All university employees have reporting responsibilities to the Civil Rights Compliance Office to ensure the university can take appropriate action:

- All university employees, except those exempted by legal privilege of confidentiality or expressly identified as a confidential reporter, have an obligation to report incidents of sexual assault immediately.
- The following employees have an obligation to report all other forms of sexual misconduct as soon as practicable but at most within five workdays of becoming aware of such information: 1. Any human resource professional (HRP); 2. Anyone who supervises faculty, staff, students, or volunteers; 3. Chair/director; and 4. Faculty member.

Course Scheule

Please note that highlighted bolded entries under the Readings/Other Assignments column are mandatory readings or websites to explore. Those in red font will form basis of class discussions or exercises.

Week No.	Session Dates (Lecturer)	Topics	Aligned Course Learning Objective(s)	Aligned Specialization Competencies	Readings/Other Assignment	Student Evaluation Activity
1	Jan 13 (Dr. Adetona)	Risk, Risk Perception, and Precautionary Principle	1, 4	MPH EHS – 1 MS EHS – 6 PhD EHS – 7	• **Paper: How Extreme is the precautionary principle. Hansson SO., 2020. Nanoethics 14:245-257** • Video (https://www.youtube.com/watch?v=3RC7EGDtOYM)	Exam, mini-quiz, Case Study/In-class Participation/Discussion Board: in-class discussion of the application of precautionary principle
	Jan 15 (Dr. Adetona)	Components of a Human Health Risk Assessment	1, 2, 4	MPH EHS – 1, 5 MS EHS – 6, 7 PhD EHS – 7, 8	• **Visit this website: (www.epa.gov/risk) and read through contents under the "Human Health Risk Assessments" link** • **Paper: Frank JW. Electromagnetic fields, 5G and health: what about the precautionary principle. 2021. Journal of Epidemiology and Community Health 75:562-566 – Instructor-led discussion + discussion board (response due by 11:59 pm on January 20)**	Exam, mini-quiz, group project report, group project presentations
		Project and Project Group Discussed and Assigned				
2	Jan 20 (Dr. Adetona)	Disciplines Applied in Risk Assessment + Application of Epidemiology in Human Health Risk Assessment	4, 6, 7	MPH EHS – 1, 5 MS EHS – 6 PhD EHS – 7	• **Paper: An Association between Air Pollution and Mortality in Six U.S. Cities. Dockery DW et al., 1993; New England Journal of Medicine 329:1753-1759** • **Paper: The Use of Epidemiology in Risk Assessment: Challenges and Opportunities. Christensen K et al., 2015; Human and Ecological Risk Assessment 21:1644-1663**	Exam, mini-quiz Case Study/In-class Participation/Discussion Board: in class discussion of the application of epidemiology
	Jan 22 (Dr. Adetona)	Fundamental Toxicology Concepts for Risk Assessment	4, 6, 7	MPH EHS – 1, 2 MS EHS – 6 PhD EHS – 7	• Visit https://www.toxmsdt.com/0-toxtutor-home.html and read the following links: "Introduction to Toxicology", "Dose and Dose Response", "Toxic Effects", "Interactions", "Toxicity Testing Methods"	
		Homework 1 Assigned				

3	Jan 27 (Dr. Adetona) Student-self-study of slides and reading materials (no class session	Fundamental Toxicology Concepts for Risk Assessment (cont'd) + Application of Toxicology in Human Health Risk Assessment	4, 6, 7	MPH EHS – 1, 2 MS EHS – 6 PhD EHS – 7	• Visit https://www.toxmsdt.com/0-toxtutor-home.html and read the following links: "Dose and Dose Response", "Toxic Effects", "Interactions", "Toxicity Testing Method • **Paper: Long-Term Air Pollution Exposure and Acceleration of Atherosclerosis and Vascular Inflammation in an Animal Model. Sun Q et al., 2005; JAMA 294 (23):3003-3010**	Exam, mini-quiz Case Study/In-class Participation/Discussion Board: in class discussion of the application of epidemiology
	Jan 29 (Dr. Adetona) Student-self-study of slides and reading materials (no class session	Hazard Identification	2, 3, 4, 6	MPH EHS – 1, 4 MS EHS – 6 PhD EHS – 7	• **Textbook Chapter: Hazard Identification by Bredfeldt T and Arrieta DE (in textbook: Toxicological Risk Assessment for Beginners. Eds Torres JA and Bobst S, 2015; Springer, New York) – available for free online at the Library at OSU**	Exam, mini-quiz, group project report, group project presentations
4	Feb 3 (Dr. Adetona) Revise Jan 27 and 29 Topics	Dose-Response (Toxicity) Assessment – Traditional Methods	2, 3, 4, 6, 7	MPH EHS – 1, 2 MS EHS – 6 PhD EHS – 7	• **Casarette and Doull's Toxicology: Basic Science of Poisons, 9th Edition. 2019. Edited by Curtis Klassen. McGraw Hill Education, New York. Read topic in Chapters 15 and 21 that are specified in the reading link in Week 4 module on Carmen.**	Exam, group project report, group project presentations
	Feb 5 (Dr. Adetona)	Dose-Response (Toxicity) Assessment – Alternative Methods (New Approach Methodologies [NAM])	2, 3, 4, 6, 7	MPH EHS – 1, 2 MS EHS – 6 PhD EHS – 7	• **Paper: New Approach Methodologies in Human Regulatory Toxicology – Not If, but How and When. Schmeisser S et al., 2023 Environment International 178: 108082.** • **Textbook Chapter: Toxicological Basis for Risk Assessment by Robson MG and Toscano WA (in textbook: Risk Assessment for Environmental Health. Eds Robson MG et al., 2023; CRC Press, Boca Raton)**	

		Revise Jan 27 and 29 Topics				
		Mini-Quiz available online from 5 pm on February 5 and due by 11:59 on February 5 in CARMEN				
		Homework 1 Due				
		Homework 2 Assigned				
5	Feb 10 (Dr. Adetona)	Dose-Response (Toxicology) Assessment: Potency Factors	2, 3, 4, 6, 7	MPH EHS – 1, 2 MS EHS – 6 PhD EHS – 7	• Benchmark Dose Technical Guidance. 2012 (Posted on Canvas) • **Textbook Chapter: Toxicological Basis for Risk Assessment by Robson MG and Toscano WA (in textbook: Risk Assessment for Environmental Health. Eds Robson MG et al., 2023; CRC Press, Boca Raton)**	Homework assignment, exam, group project report, group project presentations In-class Practice Questions: applied towards potency factors
	Feb 12 (Dr. Adetona)	Introduction to the Benchmark Modeling Dose Software (BMDS) and Dose-Response Practice Exercise	2, 3, 4, 6, 7	MPH EHS – 1, 4 MS EHS – 6 PhD EHS – 7	• Benchmark Dose Technical Guidance. 2012 (Posted on Canvas) • **Paper: Lung Cancer and Cardiovascular Disease Mortality with Ambient Air Pollution and Cigarette Smoke: Shape of Exposure-Response Relationships. Pope CA et al., 2011 Environmental Health Perspectives 119(11):1616-1621 - Group 1-led discussion + discussion board (response due by 11:59 pm on February 17)**	
		Dose-Response Practice Exercise (Homework 3) Assigned				
6	Feb 17 (Dr. Adetona)	Uncertainty in Dose-Response Analysis Exposure Assessment: Concept and Approaches	2, 3, 4, 6, 7	MPH EHS – 5 MS EHS – 6, 7 PhD EHS – 7, 8	• **Guidelines for Human Exposure Assessment. 2016. Read Chapters 2 and 4 (Posted on Canvas)** • Links to "Direct Measurement", "Indirect Estimation" and Exposure Reconstruction" and the sub-links under these links in the USEPA ExpoBox: https://www.epa.gov/expobox/exposure-assessment-tools-approaches	Exam, mini-quiz, group project report, group project presentations Homework/take-home assignment: applied towards exposure factors In-class Practice Questions: applied towards dose calculations
	Feb 19 (Dr. Adetona)	Exposure Factors + Estimation of Environmental Quantification and Intake	2, 3, 4, 5, 7	MPH EHS – 1, 4, 5 MS EHS – 6, 7 PhD EHS – 7, 8	• **Textbook Chapter: Exposure Assessment: The Ways We Measure Exposure and Its Application to Risk Assessment by Liang D (in textbook: Risk Assessment for Environmental Health. Eds Robson MG et al., 2023; CRC Press, Boca Raton)** • Exposure Factor Handbook. 2011 (Posted on Canvas)	
		Draft of First Section (Introduction and Hazard Identification) of Assigned Group Project Due				
7	Feb 24	Exposure Factors +	2, 3, 4, 5, 7	MPH EHS – 1, 4, 5	• **Guidelines for Exposure Assessment. 2016. Read Chapters 1 and 2 (Posted on Canvas)**	

	(Dr. Adetona)	Estimation of Environmental Quantification and Intake (Cont'd)		MS EHS – 6, 7 PhD EHS – 7, 8	• Exposure Factors Handbook. 2011 (Posted on Canvas)	Exam, mini-quiz, group project report, group project presentations Homework/take-home assignment: applied towards exposure factors In-class Practice Questions: applied towards dose calculations
	Feb 26 (Dr. Adetona)	Exposure Factors + Estimation of Environmental Quantification and Intake (Cont'd)	2, 3, 4, 5, 7	MPH EHS – 1, 4, 5 MS EHS – 6, 7 PhD EHS – 7, 8	• **Guidelines for Exposure Assessment. 2016. Read Chapters 1 and 2 (Posted on Canvas)** • Exposure Factors Handbook. 2011 (Posted on Canvas)	
		Homework 2 Due				
		Dose-Response Practice Exercise (Homework 3) Due				
8	Mar 3 (Dr. Adetona)	Exposure Factors + Estimation of Environmental Quantification and Intake (Practice Exercise)	2, 3, 4, 7	MPH EHS – 1, 4, 5 MS EHS – 6, 7 PhD EHS – 7, 8	• **Guidelines for Exposure Assessment. 2016. Read Chapters 1 and 2 (Posted on Canvas)** • Exposure Factors Handbook. 2011 (Posted on Canvas)	Exam, mini-quiz, group project report, group project presentations, In-class Practice Questions: applied towards dose calculations In-class Participation: identification and discussion of exposure factors
	Mar 5 (Dr. Adetona)	Risk Characterization + Guideline for Application Catch-Up on Intake Calculations (if needed)	3, 4, 5	MPH EHS – 2, 4, 5 MS EHS – 6, 7 PhD EHS – 7, 8	• **Textbook Chapter: Risk Characterization for Human Health Risk Assessment by Cope RB (in textbook: Toxicological Risk Assessment for Beginners. Eds Torres JA and Bobst S, 2015; Springer, New York) – available for free online at the Library at OSU** • **Paper: Health and Household Air Pollution from Solid Fuel Use: The Need for Improved Exposure Assessment. Clark ML et al., 2012 Environmental Health Perspectives 121(10):1120-1128 – Group 2-led discussion + discussion board (response due by 11:59 pm on March 10)**	Exam, mini-quiz, group project report, group project presentations
		Mid-Term Exam available online from 5:00 pm on March 5 and due by 11:59 pm on March 5 in CARMEN				
9	Mar 10	Risk Characterization	3, 4, 5	MPH EHS – 2, 4, 5	• **Textbook Chapter: Risk Characterization for Human Health Risk Assessment by Cope RB (in textbook:**	

	(Dr. Adetona)	+ Calculation Practice Exercise Risk Screening		MS EHS – 6, 7 PhD EHS – 7, 8	**Toxicological Risk Assessment for Beginners. Eds Torres JA and Bobst S, 2015; Springer, New York) – available for free online at the Library at OSU** • **USEPA Risk Screening Level User Guide:** https://www.epa.gov/risk/regional-screening-levels-rsls-users-guide-june-2017 • ProUCL Download (https://www.epa.gov/land-research/proucl-software)	Exam, group project report, group project presentations In-class practice question using USEPA ProUCL software to compute an exposure point concentrations for contaminated sites and comparisons to USEPA screening levels, regulatory standards and background concentrations
	Mar 12 (Dr. Adetona)	Introduction to ProUCL ProUCL + Risk Screening Practice Exercise	3, 4	MPH EHS – 2, 4, 5 MS EHS – 6, 7 PhD EHS – 7, 8	• USEPA Risk Screening Level User Guide: Visit: https://www.epa.gov/risk/regional-screening-levels-rsls-users-guide-june-2017 • ProUCL Download (https://www.epa.gov/land-research/proucl-software)	
		Draft of Second Section (Dose Response and Exposure Assessments with Updated Previous Sections) of Assigned Group Project Due				
10	Mar 17 + Mar 19	**Mid-Term Break: No Classes**				
11	Mar 24 (Dr. Adetona)	Integration of Exposure Assessment and Dose-Response Assessment (including BMDS) Tools (Practice Exercise)	3, 4	MPH EHS – 2, 4, 5 MS EHS – 6 PhD EHS – 7	• **Toxicological Review of Benzo[a]pyrene. 2017. National Center for Environmental Assessment, U.S. Environmental Protection Agency. Washington, DC. Section 2.2 (Pages 2-17-2-30); Section 2.4 (Pages 2-40-2-47); Section 2.5. (Pages 2.47-2-49) https://iris.epa.gov/static/pdfs/0136tr.pdf.** • **Paper: Occupational Exposure to Polycyclic Aromatic Hydrocarbon of Wildland Firefighters at Prescribed and Wildland Fires. Navarro KM et al., 2017. Environmental Science Technology 51: 6461-6469.** • **Students should read these materials comprehensively to prepare for the instructor-led-discussion and practice session**	In-Class Practice Question: towards computation of risk
		In-class Meetings + Consultations on Final Project				
	Mar 26 (Dr. Adetona)	Biological Markers in Risk Assessment	2, 4, 7	MPH EHS – 1, 4, 5 MS EHS – 6 PhD EHS – 7	• Textbook Chapter: Biological Monitoring of Exposure to Environmental Chemicals throughout the Life Stages by Panuwet P (in textbook: Risk Assessment for Environmental Health. Eds Robson MG et al., 2023; CRC Press, Boca Raton) • **Paper: Urinary Levels of 1-Hydroxypyrene and Health Risk Assessment in Children Living in Mexican**	Mini-quiz, In-class Participation: discuss the potential application of the biomarker in assigned reading to risk assessment

					Communities with a High Risk of Contamination by Polycyclic Aromatic Hydrocarbons (PAHs. Perez-Maldonado IN et al., 2019. International Journal of Environmental Health Research 29(3):348-357 – Groups 1-led discussion + discussion board (response due by 11:59 pm on March 31)	
12	Mar 31 (Dr. Adetona)	Ecological Risk Assessment	2, 4, 7	MPH EHS – 1, 5 MS EHS – 6, 7 PhD EHS – 7, 8	• **Visit this website: (www.epa.gov/risk) and read through contents under the "Ecological Risk Assessments" link**	Exam, In-class Participation: in class discussion of the application of ecological risk assessment in assigned reading
	Apr 2 (Dr. Adetona)	Ecological Risk Assessment (Cont'd)	2, 4, 7	MPH EHS – 1, 5 MS EHS – 6, 7 PhD EHS – 7, 8	• **Visit this website: (www.epa.gov/risk) and read through contents under the "Ecological Risk Assessments" link** • **Enuneku A et al. Levels, Distribution, Characterization, and Ecological Risk Assessment of Heavy Metals in Road Side Soils and Earthworms from Urban High Traffic Areas in Benin Metropolis, Southern Nigeria.2017. Journal of Environmental Chemical Engineering 5:2773-2781 – Groups 2-led discussion + discussion board (response due by 11:59 pm on April 7)**	
		Draft of Third Section (Risk Characterization, Conclusion, Limitations with Updated Previous Sections) of Assigned Group Project Due				
13	Apr 7 (Dr. Adetona)	Mixtures, Multiple Exposures and Cumulative Risk Assessment	2, 4, 6, 7	MPH EHS – 1, 5 MS EHS – 7 PhD EHS – 8	• Guidance on Cumulative Risk Assessment of Pesticide Chemicals That Have a Common Mechanism of Toxicity. 2002 (Posted on Canvas)	Exam In-Class Practice Question: towards computation of cumulative risk
	Apr 9 (Dr. Adetona)	Quantifying Risk for Cumulative Risk Assessment + Applicable Approaches with Calculation Practice Exercise	2, 4, 6, 7	MPH EHS – 1, 5 MS EHS – 7 PhD EHS – 8	• Guidance on Cumulative Risk Assessment of Pesticide Chemicals That Have a Common Mechanism of Toxicity. 2002 (Posted on Canvas) • **Moretto A et al. A Framework for Cumulative Risk Assessment in the 21st Century. 2017. Critical Reviews in Toxicology 47(2): 85-97**	
		Mini-Quiz available online from 5 pm on April 9 and due by 11:59 on April 9 in CARMEN				
14	Apr 14 (Dr. Adetona)	Risk Management and Its Interface	1	MPH EHS – 1, 2, 5	• **Visit this website: (https://www.epa.gov/risk/risk-management#tab-1) and read through contents**	Exam, in-class participation on components of risk

		with Risk Assessment Extra Cumulative Risk Practice Exercise		MS EHS – 6, 7, 8 PhD EHS – 7, 8, 9	• **Textbook Chapter: Risk Communication by Faustman EM et al. (in textbook: Risk Assessment for Environmental Health. Eds Robson MG et al., 2023; CRC Press, Boca Raton)**	communication, group project report, group project presentations
		In-class meetings + consultations on final project				
	Apr 16 (Dr. Adetona)	Risk Communication with Case Study Exercises	1	MPH EHS – 1, 2, 5 MS EHS – 6, 7, 8 PhD EHS – 7, 8, 9	• **Textbook Chapter: Risk Communication by Faustman EM et al. (in textbook: Risk Assessment for Environmental Health. Eds Robson MG et al., 2023; CRC Press, Boca Raton)**	Exam, in-class participation on components of risk communication, group project report, group project presentations, in-class practice exercise
15	Apr 21 (Dr. Adetona)	Catch-Up on Risk Communication and Management (if needed)	1	MPH EHS – 1, 2, 5 MS EHS – 6, 7, 8 PhD EHS – 7, 8, 9	• **Textbook Chapter: Risk Communication by Faustman EM et al. (in textbook: Risk Assessment for Environmental Health. Eds Robson MG et al., 2023; CRC Press, Boca Raton)**	Exam, in-class participation on components of risk communication, group project report, group project presentations, in-class practice exercise
		In-class meetings + consultations on final project				
	Apr 23 (Dr. Adetona)	In-Class Presentation	5, 6	MPH EHS – 1, 2, 4, 5 MS EHS – 6, 7 PhD EHS – 7, 8	• **No Reading Materials**	In-Class Presentation
		Final Fully Completed Project Reports Due by 12:00 pm				
16	Apr 30	**Final Exam (1 hour 45 minutes – due on April 30 by 8:00 pm and will be made accessible online in CARMEN by 8:00 am on April 23)**				

Alignment of Competencies with Assessments

Competencies	Assessment 1 Exams	Assessment 2 Mini Quizzes	Assessment 3 Homework Assignments	Assessment 4 Discussion Board	Assessment 5 Class Participation	Assessment 6 Group Project
MPH EHS						
1. Outline the health challenges that natural and anthropogenic contaminants in the environment can pose to population health.	X	X		X	X	X
2. Explain the physiological factors that influence human exposure and the uptake of chemical and biological environmental agents.	X	X		X	X	X
4. Access state, federal, and local resources for assessing the environmental and occupational health.			X		X	X
5. Determine the role of exposure assessment in environmental and occupational health.	X	X	X		X	X
MS EPH						
5. Communicate in writing and orally a research project's methods, results, limitations, conclusions and public health relevance.				X		X
6. Explain individual and community susceptibility and vulnerability factors that heighten the risk for populations for adverse health outcomes from environmental hazards.	X	X	X	X	X	X
7. Apply the environmental health paradigm (i.e. EHS model) to characterizing hazardous physical, chemical and biological agents relative to sources, categories, exposure matrices/pathways, distribution, human exposures, responses, societal/regulatory actions, and technological controls			X	X	X	X

PhD EHS						
6. Communicate in writing and orally a research project's purpose, methods, results, limitations, conclusions and public health relevance to both informed and lay audiences.				X		X
7. Quantify individual and community susceptibility and vulnerability factors that heighten the risk for populations for adverse health outcomes from environmental hazards.	X	X	X	X	X	X
8. Apply the environmental health paradigm (i.e. EHS model) to characterizing hazardous physical, chemical and biological agents relative to sources, categories, exposure matrices/pathways, distribution, human exposures, responses, societal/regulatory actions, and technological controls.			X	X	X	X