

Risk Assessment & Toxicology (U6221) Summer 2020 Syllabus

CLASS SESSION(S)

Th 10:00 a.m. - 12:00 p.m.

Zoom / Online (recorded)

Lab Session: 1:00-4:00 p.m.; Zoom / Online (recorded)

INSTRUCTOR

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Adjunct Instructor

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TEACHING ASSISTANTS

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Textbooks for purchase: ([Hide](#))

This course does not require or recommend the purchase of any textbooks.

COURSE DESCRIPTION

Risk Assessment is the process of correlating the amount of exposure (to a chemical, activity, or situation) with expected harm. This course is primarily concerned with chemical substances to which humans are exposed through their environments, in the context of whether and how exposure to such toxicants should be controlled. Case examples involving Contaminated and Hazardous Waste Sites are utilized to demonstrate exposure and risk assessment principles. Toxicological and epidemiological principles are used primarily to provide quantitative estimates of the harm associated with a given level of exposure (dose-response). Using a dose-response relationship necessitates quantifying exposure, an uncertain endeavor that relies on understanding human physiology and behavior. The quantitative estimates of harm from anthropogenic activity that risk assessment gives are just the starting point for the challenge of risk management and policy: i.e., "*What do we do now?*" The resulting decisions are influenced by political and economic factors (e.g., cost-benefit analysis) and by psychological factors (e.g., risk perception).

Our Summer 2020 class is unique from any prior semester I have taught at SIPA or at Columbia's Mailman School of Public Health. The class a.m. and p.m. sessions will occur "live" on Zoom and will be recorded for later viewing and reference. The morning session will generally be 2 hours in duration (10:00 – noon EDT) to discuss the lecture slides, the week's learning objectives, and to facilitate 1-3 breakout exercises (via full cohort or smaller salons; TAs to coordinate). Considering "Zoom fatigue", you and I will need a few breaks during the long day together. However, YOUR PARTICIPATION AND QUESTIONS are one of the keys to help me successfully present the learning objectives of this class; I ask that you jot down questions based on your pre-review of posted material - and during the Zoom sessions - and save for break times.

The afternoon session will be used to re-cap the morning content and discussions, and to assign the HW for the week (generally due the following Wednesday). I would like to use the 3-hr afternoon slot for (continued) student questions, both technical and administrative in nature. If you cannot pose a question (or if I cannot answer due to time restrictions), I ask that you please email me and the TAs after each Thursday session so we can fold together a list of questions / comments / responses.

Without doubt, the events taking place in the U.S. and world (COVID-19; all of the actions and reactions relating to social injustice) should facilitate student questions, discussions, debate, and concepts that can be framed within the large universe of Environmental and Human Health (and within the context and learning objectives of this compressed 5-week class). All are welcome and respected here. Case histories, media articles, and assignments will attempt to identify issues of Environmental Justice, where possible.

PREREQUISITES

None

COURSE LEARNING OBJECTIVES

Students will learn about the risk assessment framework, uncertainties, policy decision points, and the ways in which human exposures / risks can be understood and managed. The course will follow the basic outline of risk assessment: hazard identification, exposure assessment, toxicological evaluation, and risk characterization. The 4-step process is commonly followed by risk management (i.e., how to apply the numbers and data from a risk assessment). Examples of how scientific thought is utilized in environmental policy will also be demonstrated. Discussions involving Environmental Justice will be facilitated during class meeting times and in assignments.

Students who successfully complete this course will be able to:

- Identify and Describe the 4 main parts of human health risk assessment;
- Have a general understanding of concepts used to interpret environmental data;
- Discuss exposure settings for contaminated waste sites, and identify media of concern and exposure pathways that may be relevant to public health;
- Identify and discuss the differences among receptor populations as part of an exposure assessment;
- Apply toxicology concepts to a quantitative assessment;
- Perform calculations of noncancer and cancer risks for a human health risk assessment;
- Identify risk management approaches to reduce exposures and mitigate risks;
- Understand the concepts behind the development of State and Federal cleanup goals and standards;
- Apply concepts of risk communication.

Daily Activities: Lecture sessions (Thursday mornings) will include discussion and explanation of Powerpoint slides, readings / references, and/or web material with focus on applying critical thinking to environmental exposure and toxicology scenarios. Student participation is highly encouraged during the lecture sessions (jot down questions for a.m. breaks or afternoon session).

Afternoon sessions will involve both hands-on and minds-on exercises that will require either individual or small group work/reporting. Supplemental discussions from the morning's lecture session (with question and answer periods) may also occur during laboratory sessions. "Homework Assignments" will be provided prior to the afternoon sessions, with time allotted for group work each week on the Homework Assignments. For students in opposite time zones, who may not be able to participate "live" in the afternoon sessions, ample time before the assignment due date will be given to work with the other Group members and present questions to me by email or TAs during office hours.

For each lecture, notes will be posted on CourseWorks prior to the class. Students should have the posted files handy to add their own notes during the lecture. ** Assigned readings should be perused prior to class, and students should be prepared to participate in discussions in morning and/or afternoon periods. The assigned readings for each week can then be read in greater depth afterwards.

Some additional or supplemental references and readings will occasionally be posted on CourseWorks.

Method of Evaluation

1. Attendance and Lab/HW exercises will involve hands-on/minds-on exercises with reports due typically on the Wednesday following the lab session when the assignment was first presented. Group work (randomly assigned HW Groups of 4-5 students; different each week) is anticipated for all four HW Assignments, with 1 deliverable for each group. Computations via spreadsheet will be required for some assignments.

2. An exam (**August 6, 2020**). FORMAT TBD; EITHER TAKE HOME OR CLOSED BOOK "IN CLASS". Note that calculators will be needed for the exam.

3. A final group project will be required. Briefly, groups of students will outline, prepare, and communicate an actual risk assessment. Technical risk assessment work, risk communication / perception aspects, and policy

implications are to be discussed. 20-minute group presentations will be delivered **Friday August 14, 2020** (Notes or PowerPoint to be submitted at that time for grading purposes). A 5-minute question period will immediately follow the presentation.

Policy on Submission of Labs/HWs

Ten percent (10%) of the grade will be deducted per day if lab reports are submitted past the due dates. Materials that are submitted more than one week late may not be accepted.

Grades

Grades will be based on the following:

- * 35% Final Exam -
 - short answer (fill-in; multiple choice; quick math/calc problems)
 - 5-8 essay-type questions / calculations
- * 30% Lab/HW exercises. NOTE: spreadsheets will need to be utilized for some assignments. It is recommended that students retain a hard copy of the completed assignments, since answers will be discussed in Lab sessions after the assignments are handed in.
- * 20 % Group Presentation (Risk assessment and communication scenario)
- * 15 % attendance and participation

Attendance Policy

Attendance of lectures and lab Zoom sessions is expected since complementary material, in addition to required readings, will be presented in lectures and included in examinations/discussions. All Thursday Zoom sessions will be recorded, however, for those students who may not be able to make the scheduled a.m. and p.m. live sessions. Attendance and/or Participation will be recorded.