Risk Assessment & Toxicology (U6221) Summer 2023 Syllabus

CLASS SESSION(S)
Thursday 9:00 a.m. - 12:00 p.m.
IAB 413

Thursday Lab Sessions: Group B: 1:00-3:30; Group A: 3:30 - 6:00
SCH 417

- The beginning (~ 45-60 minutes) of each lab will be to recap a.m. lecture and to allow Q&A; Group work / HW assignments allotted over the remaining lab time.

INSTRUCTOR
Michael P. Musso, P.E., MS, MPH
Adjunct Instructor
E-mail: mpm36@cumc.columbia.edu

Mike Office Hours: Sundays 11:00 a.m. – 12:00 p.m. EST (Zoom), starting 7/16
https://columbiacuimc.zoom.us/j/3072971599?pwd=aGJvZUJ3QWhhYTRyTC9OZ2h5R0VyUT09

TEACHING ASSISTANTS

Desikan Jayaram (dj2658@.columbia.edu)

Office Hours: Saturday 5:00 – 7:00 p.m. EDT (Zoom):

https://columbiauniversity.zoom.us/j/91963172721?pwd=bmM4dnJyWUI4aEg3SnVQc2VpS21Ddz09

Ngoc Truong (bnt2118@columbia.edu)

Office Hours: Friday 7:00 – 9:00 p.m. EDT (Zoom):

https://columbiauniversity.zoom.us/j/99692344188?pwd=SThTaGxRM3VqTmhFa0ZFRWlYalhmUT09

Eric Smith (ees2210@columbia.edu)

Office Hours: Monday 11:15 – 1:45 p.m. EDT (in-person in the Lehman Library Basement, Group Study Room 207).

Please confirm all Office Hours ahead of time.

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 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 2023 class is unique from prior semesters I have taught at SIPA and at Columbia's Mailman School of Public Health. The morning session will generally be 3 hours in duration (9:00 a.m. – noon EDT, with breaks) to discuss lecture slides, the week's learning objectives, and readings. To facilitate, 1-2 breakout discussions exercises (via full cohort or smaller groups; TAs to coordinate) may also be added. YOUR PARTICIPATION AND QUESTIONS are one of the keys to help me successfully present the learning objectives of this class; I ask that you participate actively during class time (or jot down questions that I cannot get to in a.m. lecture time), and pose questions during your afternoon lab sessions.

The afternoon sessions will be used to re-cap the morning content and discussions, and to assign the HW for the week (generally due the following Monday or as otherwise posted). I would like to use the beginning of each 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 so we can fold together a list of questions / comments / responses.

Without doubt, the events taking place around the world (climate change; emergence from 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 6-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 in order to make decisions). Examples of how scientific thought is utilized in environmental policy will also be demonstrated. Discussions involving Environmental Justice will be facilitated during class sessions 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;
- Participate in Environmental Justice conversations, particularly as related to chemical exposures and contaminated sites;
- 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.

For each lecture, slides and supporting information will be posted on CourseWorks prior to the class. Students should bring the notes with them, either printed out or in electronic form, so they can 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 lecture and/or lab periods. The assigned readings can then be read in greater depth afterwards.

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

Laboratory 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 the laboratory sessions. "Homework Assignments" will be provided prior to the laboratory sessions, with time allotted for group work each week. Your Homework groups will be randomly assigned each week by the TA's (with one [1] deliverable/submittal by each student group for each Group Assignment).

Method of Evaluation

1. Attendance and Lab/HW exercises will involve hands-on/minds-on exercises with reports due typically on the Monday following the lab session when the assignment was first given. Computations via spreadsheet will be required for some assignments.

2. An exam (take home, to be assigned on or before August 10, 2023). Take home exam is open book and to be submitted by 11:59 p.m. August 14, 2023, or as otherwise posted on Courseworks. Exams are to be completed by each student (no group work is permitted), with certification that each student's submittal is based on his/her/their work only.

3. A final group project (Presentation) will be required. Briefly, teams of randomly-assigned 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 on Friday August 18, 2023 (Notes or Powerpoint slides to be submitted to the instructor 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 will not be accepted.

Grades

Grades will be based on the following:

* 35% Final Exam -
  - short answer (fill-in; multiple choice; math problems)
  - short essay-type questions
  - calculation-based problems for the topics covered during class time

* 35% 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 scenarios to be assigned)

* 10 % attendance and participation

Attendance Policy
Attendance of lectures and lab sessions is expected since complementary material, in addition to posted readings, will be presented in lectures and possibly included in examinations/discussions. Attendance will be recorded.

Course Environment and Additional Resources:

Names/Pronouns

You deserve to be addressed in a manner that reflects your identity. You are welcome to tell me your pronoun(s)and/or name (if different from University records) at any time, either in person or via email.

Discrimination

We embrace the diversity of gender, gender identity & expression, sex, sexual orientation, race, ethnicity, national origin, age, religion, disability status, family status, socioeconomic background, and other visible and non-visible identities. Columbia University does not tolerate unlawful discrimination, discriminatory harassment, sexual assault, domestic violence, dating violence, stalking, or sexual exploitation and all such conduct is forbidden by Columbia University Policy.

Accessibility

I want you to succeed in this course. Contact disability@columbia.edu for learning accommodations.

Duty to Report

You deserve a University community free from discrimination, harassment, and gender-based misconduct including sexual harassment, sexual assault, domestic and dating violence, stalking, and sexual exploitation. It is therefore University policy to require Columbia faculty and staff to report to EOAA any instance or allegation of prohibited conduct involving any undergraduate or any graduate student that is disclosed to, observed by, or otherwise known to that employee. This requirement to report is in place to help ensure that students are provided appropriate resources and to allow the University to mitigate harm to our community.

Confidential Resources

There are confidential resources on campus who do not have a Duty to Report, including:

Sexual Violence Response & Rape Crisis/Anti-Violence Support Center (SVR)

Ombuds Office

Medical Services

University Counseling and Psychological Services

University Pastoral Counseling

Columbia Office of Disability Services

University employees working in a confidential capacity will not report information shared with them.