Course Syllabus

Division of Environmental Health Sciences (EHS)
College of Public Health (CPH)
Department of Food Science & Technology (FST)
College of Food, Agriculture & Environmental Sciences (CFAES)
The Ohio State University

WATER CONTAMINATION: SOURCES AND HEALTH IMPACT

PUBHEHS 7360
FDSCTE 7360

Autumn Semester, 3 credit

Instructor: Jiyoung Lee, PhD
Associate Professor
Division of Environmental Health Sciences
Department of Food Science & Technology

Office location: 406 Cunz Hall
1841 Neil Avenue
(phone) 292-5546

E-mail: lee.3598@osu.edu

Class Time and Location: Thur 5:15-8:00 pm at Cunz Hall 180

Instructor's Office Hours: Email or call to schedule an appointment

TA Name, email, and office hours: Igor Mrdjen, PhD student
Office: Cunz Hall 400B
Email: mrdjen.1@osu.edu
Office hours: by appointment

TA responsibilities:
The TA assigned to the course will hold regular office hours and answer questions from students who need help with class material. The TA assists with scoring quiz and uploading course materials; however, final grades will be assigned by the professor. Any questions regarding grading should be directed to the professor and not the TA.

Description:
Water contamination affects our health and daily life in various ways. It has been one of the biggest pollution problems for the past decades and is gaining new attention since we now face and expect extreme weather events more frequently due to climate change and
the water resources are getting limited. The water contaminants include biological infectious agents, chemical pollutants and other toxic agents that are transmitted primarily via water, but also air, soil, food and human activities. The lectures are designed to provide understanding about the sources of contamination, the pathways of transport, public health impacts and interventions. Emerging issues as well as fundamental issues will be discussed.

**Class Format:**
This course is lecture-based. Small group discussions and brief presentations are incorporated throughout the course.

**Course Objectives:** After successfully completing the course, students will be able to:

1. Provide an overview of the impact of water pollution on human health.
2. Describe the environmental contaminants and associated diseases.
3. List the common biological and chemical pollutants and federal guidelines about water-related pollution.
4. Describe pathways of pollutant transmission via water and other related matrices.
5. Outline biomonitoring, aquatic toxicity and other emerging contaminant issues.
6. Describe the treatment technology for remediating water contamination.

**This course covers following competencies:**

**MPH Specialization**
1. Explain the significance of the community and workplace environment to public health.
2. Outline the health threat that natural and anthropogenic contaminants in the environment can pose to population health.
3. Compare the fate, transport, and human uptake of chemical and biological agents.
4. Explain the physiological factors that influence human exposure and the uptake of chemical and biological environmental agents.
5. Critique and conduct human risk assessments.
6. Identify and explain individual (e.g., genetic, physiologic and psychosocial) and community (social, built, economic, race) susceptibility factors that heighten the risk for populations for adverse health outcomes from environmental hazards.
7. Define, recognize, and explain environmental justice and its significance as a public health issue.
8. Use various risk management and risk communication approaches for environmental hazards.
9. Summarize the underlying mechanisms of toxicity resulting from exposure to environmental agents.
10. Describe federal and state regulatory programs, guidelines and authorities relevant to environmental and occupational health.
11. Access state, federal, and local resources for assessing environmental and occupational health.
12. Work with other public health disciplines (e.g., nurses, physicians, veterinarians, epidemiologists, biostatisticians) to address environmental and occupational health concerns.
13. Compare the principle components and influencing factors in the exposure continuum from source to disease.

**MS Competencies**
1. Read the scientific literature in the student’s field and critique the methods and results.
2. Conduct literature reviews to evaluate the state of the science regarding specific topics.
3. With input from the student’s advisor, identify an unanswered research question, formulate a hypothesis, and design a research study.
4. Write a research proposal.

**PhD competencies**
1. Conduct thorough literature reviews to summarize and evaluate the state of the science regarding new topics in the student’s general area or specialization.
2. Identify gaps in that literature and formulate research questions designed to address those gaps.
3. Formulate hypotheses and design a research study using the appropriate research methods and approaches.
4. Prepare a research proposal to address the research question, with particular attention to study design; subject selection; measurement of variables; methods for sample size determination, data collection, data management and data analysis; and interpretation of results.

**Prerequisite:** Previous coursework in college level biology and chemistry are required.

**Reading Materials:** Reading materials covering the lecture topics are specified in the syllabus and will be posted on Carmen.

**Grading:**

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<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Class attendance and participation</td>
<td>10 %</td>
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<tr>
<td>Quiz</td>
<td>50 %</td>
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<tr>
<td>Term project</td>
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<tr>
<td>a. Written paper</td>
<td>33%</td>
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<tr>
<td>b. Presentation</td>
<td>7%</td>
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Course grades are determined by points. The minimum percentage to achieve a given grades are as follows:

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<thead>
<tr>
<th>Grade</th>
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<tbody>
<tr>
<td>93</td>
<td>A</td>
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<tr>
<td>90</td>
<td>A-</td>
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<tr>
<td>87</td>
<td>B+</td>
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<td>83</td>
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<td>67</td>
<td>D+</td>
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<tr>
<td>63</td>
<td>D</td>
</tr>
<tr>
<td>60</td>
<td>D-</td>
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**Term paper:**
Topics should be about ‘water contamination’ issues that have ‘human health impact’. Team effort is highly encouraged (e.g. 2-3 people per team). If you should do in solo, check with the instructor. The format is a research grant proposal. The term paper should include **Cover Page** that has title of the project, the student’s name, email address, department, advisor’s name and an abstract. The abstract should have 150 words or less describing the summary of your project. Key words should be provided (5 max) at the end of the abstract. **Project Narrative** should contain following components:
1) Introduction that clearly introduces the topic of the project (identify the contaminant(s), sources, transport, how exposure happens, health impact, etc) and why this work is important and how the project will improve water quality and human health. Clearly outline the objectives of the project

2) Significance and Innovation that clearly state why your project is innovative and clarify ‘what the problem is’, the knowledge gap and significance of the project

3) Approach that define the research questions and describe the activities proposed and methods to be used in carrying out the proposed project, including the feasibility of the methods, expected outcomes, means by which results will be analyzed, how results will be used, pitfalls and limitations of the propose procedures.

Graphical Abstract should summarize the content of your project in a concise, pictorial form designed to capture the main theme and approach of your project. The graphical abstract should fit in a page.

Proper literature review and accurate citations should be included. It should be with 1-inch margins in Microsoft Word and 12-point font size. The Cover Page and Project Narrative has 3-page limit. Budget is not needed, however, it can be attached and page limit is not applied. Curriculum vitae should be attached (1-page limit per person). The CV and references are not counted toward the 3-page limit. Everything should be in one Microsoft Word or PDF file with the following order: Graphical Abstract (1 page max), Cover Page and Project Narrative (3 page max), References, CV, and budget (optional).

Presentation is 20 min per team (15 min for presentation and 5 min for Q and A). The grade of presentation is based on showing full understanding about the chosen topic, critical and logical thinking, answering questions, and effective presenting skills. Powerpoint slides are required and should be uploaded at Carmen Dropbox by 11am on the assigned presentation day. During presentation, entire class should listen carefully and engage in Q and A session. The listeners should provide honest feedback and evaluation for the presenters using the evaluation form.

Quizzes: Closed book. In-class. Multiple choice, True/false, and short answer format. Quizzes will be taken frequently.

Carmen:
Lecture notes and reading materials will be posted on Carmen. All news and instructions for quiz, term paper and other course-related information will be posted on CourseHome of Carmen.

Class Policies:
Any unexcused absence will be counted in the Class Attendance grade. Cell phone usage is not allowed during the class unless it is cleared earlier for legitimate reasons. Computer can be used only for seeing the lecture notes. Other usages of a computer are not allowed.

Accommodation for special needs:
If you need an accommodation based on the impact of a disability, you should contact me to arrange an appointment as soon as possible. At the appointment we can discuss the course format, anticipate your needs and explore potential accommodations. I rely on the Office for Disability Services for assistance in verifying the need for accommodations and developing accommodation strategies. If you believe you need accommodation and have
not previously contacted the Office for Disability Services, I encourage you to do so (more information available at http://www.ods.ohio-state.edu/).

Academic Integrity:
Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University, the College of Public Health, and the Committee on Academic Misconduct (COAM) expect that all students have read and understood the University’s Code of Student Conduct and the College’s Student Handbook, and that all students will complete all academic and scholarly assignments with fairness and honesty. The Code of Student Conduct and other information on academic integrity and academic misconduct can be found at the COAM web pages (http://oaa.osu.edu/coam/home.html). Students must recognize that failure to follow the rules and guidelines established in the University’s Code of Student Conduct, the Student Handbook, and in the syllabi for their courses may constitute “Academic Misconduct.”

The Ohio State University’s Code of Student Conduct (Section 3335-23-04) defines academic misconduct as: “Any activity that tends to compromise the academic integrity of the University, or subvert the educational process.” Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Please note that the use of material from the Internet without appropriate acknowledgement and complete citation is plagiarism just as it would be if the source were printed material. Further examples are found in the Student Handbook. Ignorance of the Code of Student Conduct and the Student Handbook is never considered an “excuse” for academic misconduct.

If I suspect a student of academic misconduct in a course, I am obligated by University Rules to report these suspicions to the University’s Committee on Academic Misconduct. If COAM determines that the student has violated the University’s Code of Student Conduct (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in the course and suspension or dismissal from the University. If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

Course schedule:

1. 8/24/17 Course Overview & Introduction of Water

Readings:


2. 8/31/2017  Water contaminants and problems: US and worldwide

Readings:
National Primary Drinking Water Regulations:
https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations

Contaminant Candidate List (CCL):
- Final CCL4 Chemical Contaminants List
  https://www.epa.gov/ccl/chemical-contaminants-ccl-4
- Final CCL4 Microbial Contaminants List
  https://www.epa.gov/ccl/microbial-contaminants-ccl-4


3. 9/7/17  Agricultural runoff and urban runoff & storm water management (bioretention)

Readings:

U.S. Geological Survey (USGS) website
- Runoff: http://ga.water.usgs.gov/edu/runoff.html
- Surface runoff: http://ga.water.usgs.gov/edu/waterrcycrunoff.html
- Urban runoff: http://ga.water.usgs.gov/edu/urbanrun.html


4. 9/14/17 Issues Related to Drinking Water Distribution System (Dr. Mark Weir)

Readings:

5. 9/21/17 Freshwater harmful algal blooms & cyanotoxins: causes, health impact, monitoring, guidelines & mitigation

Readings:
Harmful algal blooms: Information for public water systems (Ohio EPA) http://epa.ohio.gov/ddagw/HAB.aspx


9/21/17 Group Discussion:
- US water problems & global water crisis
- What concerns do we have?

6. 9/28/17 Endocrine disruptors in water (Dr. Zuzana Bohrerova)
Readings:


9/28/17 Quiz (Lecture 1-4)

7. 10/5/17 Recreational water: contamination sources, pathogens and health impact

Readings:


OSU’s tradition, Mirror Lake Jump as an example of extreme recreational water event: History & diverse perspectives

Readings:


8. 10/12/17 Autumn Break (no class)
9. 10/19/17  Water and agriculture: Lessons learned from Ohio

Ohio Farm Bureau Federation: Water quality issues
- Plan to reduce phosphorus entering Lake Erie
- Erie County Farm Bureau water quality tour
- 4R Technology Review
- Ohio farmers testifies before congress about agriculture community’s water quality efforts
- Farmers’ efforts having positive impact on state’s water quality

https://ofbf.org/tag/clean-water/

10/19/17  Group Discussion about Term Paper Topics

10. 10/26/17  Climate Change: impact on water quality & climate-water-food nexus

Readings:


10/26/17  Quiz (Lecture 5- 9)
11. 11/2/17  Lake Erie Critical Issues and the Work being done to address these Concerns

Readings:
Lake Erie Programs. Ohio EPA. 
http://www.epa.state.oh.us/dsw/lakeerie/index.aspx

Ohio Lake Erie Phosphorus Task Force II Final Report

12. 11/9/17  Ground Water Issues (Dr. Motomu Ibaraki)

Readings:
US EPA. Ground Water Contamination


Well Water Should Be Tested Annually to Reduce Health Risks to Children

13. 11/16/17  Water and Energy: Hydraulic fracturing and its impact on water quality

Readings:
Science 328: 1624-1626. 
http://www.sciencemag.org/content/328/5986/1624.full.pdf


Ohio EPA. 2012. Sources of water for hydraulic fracturing fluids [http://www.epa.state.oh.us/Portals/0/general%20pdfs/sources%20of%20water%20for%20hydraulic%20fracturing%20fluids.pdf](http://www.epa.state.oh.us/Portals/0/general%20pdfs/sources%20of%20water%20for%20hydraulic%20fracturing%20fluids.pdf)

14. 11/23/17  Thanksgiving (No class)

15. 11/30/17  Term project presentations and discussion

⚠️ 11/30/17  Quiz (Lecture 10-13)