ENV H 543: Environmental & Occupational Health Microbiology III: Quantitative Microbial Risk Assessment

Spring Quarter, 2007
Monday, Wednesday, and Friday, 12:30-1:20
HSL Computer Lab A

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OFFICE HOURS: By Appointment

COURSE DESCRIPTION:
This course will cover the processes involved in quantitative assessment of the risk posed from environmentally transmitted pathogens. The course material will be divided into discrete sections representing the basic steps of QMRA: hazard identification, exposure assessment, health effects assessment, risk characterization, and risk communication. This course will be of use for public health and health care professionals, microbiologists, civil and environmental engineers, environmental scientists and bio-defense specialists.

COURSE LEARNING OBJECTIVES:
By the end of this course, students will be able to:

1. List and describe the differences between microbial and chemical risk assessment.
2. Define the purpose and recognize the benefits and limitations of quantitative microbial risk assessment.
3. Identify and define microbial risks.
4. Identify and summarize the major routes of exposure for microbial threats.
5. Recognize and outline the basic frameworks for quantitative microbial risk assessment.
6. Identify microbial hazards and formulate specific problems for which to assess risk.

7. List and distinguish between the various health endpoints for a quantitative microbial risk assessment.
8. Summarize the major host, microbial, and environmental factors affecting exposure assessment.
9. Define and apply deterministic models for the assessment of microbial risk.
10. Compare and contrast deterministic and probabilistic approaches to assessment of microbial risk.
11. Apply probabilistic techniques to assess microbial exposures.
12. Summarize the major host, microbial, and environmental factors affecting dose response analysis.
13. Recognize and apply common curve fitting models to dose response data.
14. Integrate exposure and dose/response assessments to arrive at quantitative estimate of individual and population risks.
15. Define and discuss common metrics for the expression of microbial risk.
16. Evaluate sensitivity and uncertainty in microbial risk estimates.
17. Analyze and critique published microbial risk assessments
18. Recognize and define appropriate use of quantitative microbial risk assessment.
19. Identify and explain the factors involved in risk communication.

TEXTS AND REFERENCES:

The recommended text for this course is *Quantitative Microbial Risk Assessment* (Haas, Rose, and Gerba; John Wiley & Sons, Inc.). Another text *Microbiological Risk Assessment in Food Processing* (Brown and Stringer; Woodhead Publishing) is available online at http://www.knovel.com/knovel2/Toc.jsp?BookID=683. Additional Readings and course materials will be available through the course webpage or handed out in class. The following texts are recommended supportive references for course topics:

Books-
Manual of Environmental Microbiology, 2nd edition, ASM Press
Disinfection, Sterilization and Preservation, 5th edition, LWW
Metcalf and Eddy's Wastewater Engineering: Treatment and Reuse, McGraw-Hill
Water Quality and Treatment, 5th edition, AWWA
Bioaerosols Handbook, Lewis
Food Microbiology, Doyle
Any Basic Microbiology Text (e.g. Madigan, Martinko and Parker; Prescott, Harley and Klein; etc.)

Journals-
Journal of Applied Microbiology
Letters in Applied Microbiology
Journal of Applied and Environmental Microbiology

Journal of American Water Works Association
Journal of Food Protection
International Journal of Food Microbiology
Water Science and Technology
Water Research
Emerging Infectious Disease

CLASS PARTICIPATION: Although class attendance is not expressly required, students will be expected to participate in classroom discussion and group learning activities. Students will not have the opportunity to earn class participation credit for course periods during which they are absent.

COURSE FORMAT: Class periods will typically be divided into discrete segments, for example:

- 5-10 minute question and answer session
- 30-35 minute lecture on syllabus topic
- 5-10 minute question and summary

GRADING OPPORTUNITIES:

For the sake of this class, letter and numerical grades will typically be distributed according to the university grading scale between the following standards:

A (4.0)=	Excellent and exceptional work (typically >90% of available points)
D (1.0) =	Deficient work (typically <66% of available points)

It is expected that most students will perform at a level of ~3.5.

Points will be available according to the following percentage breakdown:
Curriculum Vitae (5%): Each student will be required to provide a 1-2 page CV describing the student's background and interests. CVs will be due by the second class period.
Homework (20%): Students will have the opportunity to complete 4 homework assignments, each worth 5 % of the overall grade. Homework assignments will be designed around each of the major steps in a QMRA (hazard identification, exposure assessment, health effects assessment, and risk characterization) and are meant to guide the student towards successful completion of the oral presentation and final written risk assessment.
Midterm Exam (20%): Midterm exam will consist primarily of short answer questions, but may include multiple choice, and fill-in the blank questions as well. Exam will be conducted during a scheduled course period. Exam will be open book and open note. Once graded exams are returned, students will have one week to provide an explanation of why any incorrect answers were wrong and provide the correct answers as an opportunity to recover up to ½ of missed points. Early or make-up exams will only be offered in case of emergencies or prior arrangement with

instructor. Format for early and make-up exams is left to the discretion of instructor.

Class Participation (15%): Students may earn participation credit by contributing to classroom discussion or participation in question answer sessions. Additionally, participation-credit questions may be asked in class for email response. Students will also be expected to participate equitably in their risk assessment groups. Peer evaluation will determine group participation.

Oral Presentation of Risk Assessment (15%): Students will give in-class presentations of risk assessments on their chosen topics during the last two weeks of class.

Final Risk Assessment (25%): Final written risk assessments will be due by the scheduled final exam time. Final written risk assessments may be submitted by email. Final written risk assessment shall be the culmination of homeworks and orally presented risk assessment.

ACADEMIC ACCOMODATIONS: To request academic accommodations due to disability, please contact Disabled Student Services, 448 Schmitz, (206) 543-8924 (V/TTY). If you have a letter from Disabled Student Services indicating that you have a disability that requires academic accommodations, please present the letter to me so we can discuss the accommodations you might need in this class.

COURSE CONTENT OUTLINE:

Date	Topic	Instructor	Due
31-Mar	Introduction/Why is Microbial Risk Assessment Different than Chemical Risk Assessment	Meschke	
2-Apr	Overview of Microbial Risk Assessment Frameworks	Meschke	
4-Apr	Identification of Microbial Risks/Review of Exposure Routes	Meschke	CV
7-Apr	Problem Formulation/Determination of Health Endpoint	Shin	
9-Apr	Exposure Assessment I (Host Factors)	Shin	
11-Apr	Group Meetings	Meschke	Problem Formulation
14-Apr	Exposure Assessment II (Microbe and Environmental Factors)	Meschke	
16-Apr	Deterministic Methods of Exposure Assessment **MEET IN COMPUTER LAB A**	Kissel	
18-Apr	Probabilistic Methods of Exposure Assessment I **MEET IN COMPUTER LAB A**	Kissel	
21-Apr	Probabilistic Methods of Exposure Assessment II **MEET IN COMPUTER LAB A**	Kissel	
23-Apr	Dose Response Assessment I (Host Factors)	Shin	Exposure Assessment
25-Apr	Dose Response Assessment II (Microbe and Envrionmnental Factors)	Meschke	
28-Apr	Dose Response Modeling I (Instructional) **MEET IN COMPUTER LAB A**	Kissel	
30-Apr	Dose Response Modeling II (Hands On) **MEET IN COMPUTER LAB A**	Kissel	
2-May	Methods for Characterization of Risk I (Instructional) **MEET IN COMPUTER LAB A**	Kissel	Dose Response Assesment
5-May	Methods for Characterization of Risk II (Hands-on) **MEET IN COMPUTER LAB A**	Kissel	
7-May	Sensitivity and Uncertainty Analyses **MEET IN COMPUTER LAB A**	Kissel	
9-May	Characterization of Risk (Risk Metrics: DALYs, QALYs, etc)	Meschke	
12-May	**Exam**		
14-May	Appropriate Use of QRMA/Risk Communication	Meschke	Risk Characterization
16-May	Water/Food Risk Assessments	Meschke	
19-May	Air/Surface Risk Assessments	Meschke	
21-May	Laboratory/Institutional Risk Assessments	Meschke	
23-May	**Group Presentations**		
26-May	Holiday-Memorial Day		
30-May	Shellfish Management/HACCP	Antee	First Draft of Write-up
2-Jun	No Class--ASM		
4-Jun	No Class--ASM		
6-Jun	Group Meetings	Meschke	
12-Jun	**Final Risk Assessments and Group Evaluations Due by 10:30**		Final Risk Assessment

READINGS

Students will be assigned readings for each class session. These readings will typically be 20-25 pages in length (though combined readings may be assigned for multiple sessions exceeding this length). Readings will commonly be chapters from the recommended text or other reference texts, but may include website or journal articles.

COURSE RULES

1. Come to class, please try to let me know ahead of time if you can not make it.
2. Arrive on time
3. Turn in assignments on time
4. Come to class prepared (keep up with reading)
5. Be courteous (No newspapers, audible cell phones, PDAs, beepers)
6. Food and drinks are welcome (but keep it quiet)
    a. Exception-No food or drink in laboratory
7. Refrain from unnecessary talking
8. ASK QUESTIONS
9. Try to remain awake (at least no snoring please)
10. Let me know how I am doing (if I am moving too fast, not being clear, or otherwise not getting the message across, I need to know.)