



## Course Syllabus: Public Health Microbiology II - EnSE 314

<b>Division</b>	Biological and Environmental Sciences & Engineering Division
<b>Course Number</b>	EnSE 314
<b>Course Title</b>	Public Health Microbiology II
<b>Academic Semester</b>	Spring
<b>Academic Year</b>	2017/2018
<b>Semester Start Date</b>	01/28/2018
<b>Semester End Date</b>	05/24/2018
<b>Class Schedule</b> (Days & Time)	01:00 PM - 02:30 PM   Mon Thu

Instructor(s)				
Name	Email	Phone	Office Location	Office Hours
Peiyong Hong	Peiyong.Hong@kaust.edu.sa	+966128082218		Weekdays 9 AM to 5 PM. Please send email to <a href="mailto:peiyong.hong@kaust.edu.sa">peiyong.hong@kaust.edu.sa</a> to check on my availability. Office location: Building 4 Level 4 Room 4275

Teaching Assistant(s)	
Name	Email
Muhammad Raihan Jumat	raihan.jumat@kaust.edu.sa

Course Information	
<b>Comprehensive Course Description</b>	<p><b>Week 1-2:</b> Introduction to the water bodies and their contamination sources, Types of waterborne pathogens and their infectivity dosages, reduction rates of biotic contaminants in conventional water treatment systems, Regulations for potable drinking water.</p> <p>Regulations for recreational water, Methods to detect indicator microorganisms in recreational water (freshwater and marine), Legionella, microbial regrowth, disinfection and inactivation</p> <p><b>Week 3-4:</b> Alternative indicators. Molecular-based fecal source tracking approaches, lacZ, uidA genes. Aquaculture and opportunistic pathogens. Zoonotic diseases. Cyanotoxins. Water quality. Methods to detect indicator microorganisms in drinking water and freshwater, Limitations of current methods.</p> <p><b>Week 5-6:</b> Introduction to the wastewater and water reuse, wastewater reuse guidelines and quality requirement, protozoa or host-associated pathogens, viruses, fate and persistence, inactivation rates and methods to determine, emerging bacterial contaminants (e.g. antibiotic resistance genes and mobile genetic elements).</p> <p><b>Week 7-9:</b> Introduction to Quantitative Microbial Risk Assessment (QMRA). Illustrate the framework of QMRA. Previous lectures have been about hazard identification and methods to quantify the abundances/concentration of microbial agents. Exposure assessment. Conducting human and animal epidemiological studies. Consolidating the infectivity dosage of microbial agents and determination of dose-response. Risk characterization and assessments.</p> <p><b>Week 10-end:</b> Lab project, Final group presentation, Discussion (Q&amp;A for final examination)</p>

<b>Course Description from Program Guide</b>	An introduction to the diversity of microbial agents that can impact the public health and environmental systems. The course is structured to detail the microbial hazards found in waters, soils and air. Molecular biology techniques and the current regulatory methods for investigating pathogens and the surrogate indicators will be discussed. Treatment and engineering strategies are discussed. The latter part of the course serves to provide an introduction to Quantitative Microbial Risk Assessment (QMRA). The concepts related to exposure assessment and risk characterization will be included. Practical lab classes will be incorporated as soon as student laboratories are available.
<b>Goals and Objectives</b>	The course focuses on the microbial contaminants in water and wastewater, and how the presence or abundance of these contaminants would relate to water quality and public health. Students will be introduced to the water and wastewater treatment processes, and the various concepts associated with the evaluation of these treatment technologies. Students will then be introduced to the regulations and/or standards suggested by World Health Organization, US-Environmental Protection Agency and various local agencies. Standard methods used to determine the microbial contaminants, and the limitations associated with each standard method will be discussed. New promising alternative methods that can be used to complement the standard methods will also be taught. Lastly, after learning about the regulations and various treatment technologies, students will learn to utilize quantitative microbial risk assessment (QMRA) to provide systematic evaluation of the potential health risks arising from a known concentration of microbial contaminants. Students will be asked to incorporate the QMRA concept to decide which technology to use for wastewater or water treatment, given a known amount of microbial contaminants.
<b>Required Knowledge</b>	None
<b>Reference Texts</b>	Textbook, scientific papers and references relevant for each theme will be listed in the lecture notes.
<b>Method of evaluation</b>	<b>30.00%</b> - Final exam <b>40.00%</b> - Research Project <b>20.00%</b> - Midterm exam <b>10.00%</b> - Attendance and Participation
<b>Nature of the assignments</b>	Research project will require either a report or presentation
<b>Course Policies</b>	No plagiarism, no unaccounted absence from lectures
<b>Additional Information</b>	

## Tentative Course Schedule

*(Time, topic/emphasis & resources)*

<b>Week</b>	<b>Lectures</b>	<b>Topic</b>
1	Mon 01/29/2018 Thu 02/01/2018	Introduction, bacterial pathogens
2	Mon 02/05/2018 Thu 02/08/2018	Bacterial, viral pathogens
3	Mon 02/12/2018 Thu 02/15/2018	Viral pathogens and techniques in virology
4	Mon 02/19/2018 Thu 02/22/2018	Organic contaminants and standard methods
5	Mon 02/26/2018 Thu 03/01/2018	Drinking water microbiology
6	Mon 03/05/2018 Thu 03/08/2018	Drinking water microbiology
7	Mon 03/12/2018 Thu 03/15/2018	Recreational water quality
8	Mon 03/19/2018 Thu 03/22/2018	Mid-term exams; Water reuse, fate and persistence
9	Mon 03/26/2018 Thu 03/29/2018	Water reuse, fate and persistence
10	Mon 04/02/2018 Thu 04/05/2018	Quantitative microbial risk assessment
11	Mon 04/09/2018 Thu 04/12/2018	Quantitative microbial risk assessment
12	Mon 04/16/2018 Thu 04/19/2018	Lab practical
13	Mon 04/23/2018 Thu 04/26/2018	Lab practical
14	Mon 04/30/2018 Thu 05/03/2018	Lab practical
15	Mon 05/07/2018 Thu 05/10/2018	Lab practical
16	Mon 05/14/2018 Thu 05/17/2018	Study period
17	Mon 05/21/2018 Thu 05/24/2018	Final exam; submission of report/presentation
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### Note

The instructor reserves the right to make changes to this syllabus as necessary.