جامعة الملك عبدالله للعلوم والتقنية
King Abdullah University of Science and Technology

Course Syllabus: Microbiological Aspects of Water Sources - EnSE 214

Division	Biological and Environmental Sciences & Engineering Division
Course Number	EnSE 214
Course Title	Microbiological Aspects of Water Sources
Academic Semester	Spring
Academic Year	2016/2017
Semester Start Date	01/22/2017
Semester End Date	05/18/2017
Class Schedule (Days & Time)	10:30 AM - 12:00 PM | Sun Wed

Instructor(s)

Name	Email	Phone	Office Location	Office Hours
Johannes Simon Vrouwenvelder	Johannes.Vrouwenvelder@kaust.edu.sa	+966128084851 8084851		Instructure name: Hans Vrouwenvelder, Johannes.vrouwenvelder@kaust.edu.sa, Office location: Bld. 4, Level 4, room 4274, office hours: 9:30-10:30 Sun, Wed.

Teaching Assistant(s)

Name	Email

Course Information

Comprehensive Course Description	Safe drinking water is important for society. The United Nations Millennium Development Declaration called in 2000 for the world to halve the proportion of people without access to safe drinking water by 2015. This course will address microbiological aspects of water sources, drinking water production and distribution (e.g. microbiology basics, microbial growth, pathogens, biofilms and biofouling). The course will address both science and applied aspects. There will be student seminars and an assignment on numerical modelling of biofilms. If possible a visit to a research centre and a desalination plant that produces drinking water.
Course Description from Program Guide	This course addresses microbiological aspects of water sources, drinking water production and distribution. The topics to be covered include: microbiology basics, pathogens, drinking water production, biological stable water, distribution of drinking water (e.g. effect of material types), biofilms, biofouling, biofouling of membranes, biofilm modelling, etc. There will be student seminars, guest lecturers and a research center visit.

Goals and Objectives	The students are expected to develop answers to the following questions at the end of the semester: -What are the definitions of biological stability, biofilm and biofouling? -How much bacteria can be grown per mL on a nutrient concentration of 1 microgram C/L? -How can biofouling be quantified? -What methods exist for measuring biological stability and which one would you prefer (including why)? -List and describe suitable methods to measure the microbial drinking water quality? -What strategies reduce and prevent biofouling? -How can the biological stability of drinking water be improved?
Required Knowledge	None
Reference Texts	1) Biofouling of spiral wound membrane systems. IWA-publishing. ISBN: 9781843393634,1st Edition, 2011, 333 p. 2) Microbial Growth in Drinking Water Supplies Problems, Causes, Control and Research Needs. Editor(s): Dirk van der Kooij and Paul W.J.J. van der Wielen. Publication Date: 14 Jun 2013. IWA-publishing ISBN: 9781780400402. Pages: 500. Paperback.
Method of evaluation	**60.00**% - Final exam **15.00**% - Presentation **15.00**% - Course Project(s) **10.00**% - Attendance and Participation
Nature of the assignments	There will be two homework (each 15%) assignments: (1) numerical modelling of biofilms (course project) and a (2) student seminar (presentation).
Course Policies	Course policies -There will be 2 homework assignments (each 15%) -Attendance is mandatory for all lectures and it accounts for 10% of your final grade -There will be one written exam (60%)
Additional Information	-The instructor will provide detailed ppt slides and a text document containing basic background information on Blackboard or by e-mail. -A visit to a research laboratory may be organized. -A visit to a seawater desalination plant (producing drinking water) may be organized.

Tentative Course Schedule *(Time, topic/emphasis & resources)*		
Week	**Lectures**	**Topic**
1	Sun 01/22/2017 Wed 01/25/2017	Introduction course and microbiology
2	Sun 01/29/2017 Wed 02/01/2017	Membranes for production of high water quality
3	Sun 02/05/2017 Wed 02/08/2017	Biofilms
4	Sun 02/12/2017 Wed 02/15/2017	Fouling and Biofouling of membranes
5	Sun 02/19/2017 Wed 02/22/2017	Water transport through biofilms
6	Sun 02/26/2017 Wed 03/01/2017	Strategies for monitoring and improving membrane performance
7	Sun 03/05/2017 Wed 03/08/2017	Numerical modelling of biofilm growth (I)
8	Sun 03/12/2017 Wed 03/15/2017	History of drinking water microbiology
9	Sun 03/19/2017 Wed 03/22/2017	Biological stability of drinking water: impact of water
10	Sun 03/26/2017 Wed 03/29/2017	Biological stability: impact of materials
11	Sun 04/02/2017 Wed 04/05/2017	Spring Break: no class
12	Sun 04/09/2017 Wed 04/12/2017	Biological stability: impact of biofilms
13	Sun 04/16/2017 Wed 04/19/2017	Biological stability: recent developments
14	Sun 04/23/2017 Wed 04/26/2017	Methods for evaluation of microbial water quality
15	Sun 04/30/2017 Wed 05/03/2017	Student Assignment: numerical modelling of biofilm growth (II)
16	Sun 05/07/2017 Wed 05/10/2017	Student presentations (I)
17	Sun 05/14/2017 Wed 05/17/2017	Student presentations (II)
18		Exam

Note

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