Global Water, Sanitation and Hygiene
ENVR 890 Section 003
ENVR 296 Section 003
Spring 2007
Tues/Thurs 3:30-4:45 PM, 1304 McGavran-Greenberg

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Assignments - Final added!

Course Materials: No required text.
PowerPoint slides for most lectures will be posted on the class website/Blackboard prior to the lecture.
The World Health Organization CD distributed in class contains many of the reading assignments for the course. Other material may be added; most readings will be listed in the syllabus below.
General reading by subject

Course website: http://www.unc.edu/courses/2007spring/envr/890/003/

Course Objectives:
This course focuses on water, sanitation and hygiene in both developing and developed countries from an environmental health perspective. It emphasizes an appreciation and understanding of the need to develop effective, appropriate, accessible and affordable measures to reduce the global burden of disease from environmental exposures to biological and chemical agents of human health and environmental concern. The course content is based on the World Health Organization risk-based framework that uses risk assessments of health effects from exposures to pathogenic (disease-causing) microbes and toxic chemicals in environmental media to inform the development of holistic, integrated risk management policies and systems. Exposures to various agents of health concerns via water, wastes, air, vectors and other transmission routes will be considered, as will the various prevention and control measures of risk management systems intended to reduce these exposures.

Eligibility and prerequisites
Enrollment is limited to graduate students and upper level undergraduates who have core knowledge in chemistry, biology, epidemiology and statistics. This core knowledge would be satisfied by undergraduate or entry level graduate courses in chemistry though organic chemistry, biochemistry, microbiology or cell biology and epidemiology. Core knowledge in risk assessment is also recommended.

Tentative Course Schedule (May change to accommodate guest presenters & student needs)

Date	Lecture	Readings/Resources
01/11	Course details and introductory material	"Global Water Supply and Sanitation Assessment 2000 Report" from CD directory "Global monitoring: water supply and sanitation"
01/16	Global burden of disease and Water/Sanitation/Hygiene (handouts will be provided for this class)	WHO: Evaluation of the costs and benefits of water and sanitation improvements at the global level
01/18 01/23	Course overview Quantitative microbial risk assessment	Crabtree, K.D. et al. 1997. "Waterborne adenovirus: a risk assessment". *Water Science and Technology* 35(11-12): 1-6. Couch, R.B. et al. 1966. "Effect of route inoculation on experimental respiratory viral disease in volunteers and evidence for airborne transmission". *Bacteriological Reviews* 30(6): 517-529. Havelaar, AH and JM Melse. 2003. Quantifying public health risk in the WHO Guidelines for Drinking Water Quality: A burden of disease approach. Haas, C and JNS Eisenberg. 2001. Risk Assessment. In Water quality - Guidelines, standards and health: Assessment of risk and risk management for water-related infectious disease. Lorna Fewtrell and Jamie Bartram, Eds.

		Published on behalf of the WHO by IWA Publishing, London. Howard, G, Pedley, S, and S Tibatemwa. 2006. Quantitative microbial risk assessment to estimate health risks attributable to water supply: Can the technique be applied in developing countries with limited data? *Journal of Water and Health* 4(1): 49-65. (Added 1/23/07) World Health Organization. 2004. Health Based Targets. In Guidelines for Drinking-water Quality. Vol. 1 : 3rd Ed. World Health Organization. 2004. Microbial Aspects. In Guidelines for Drinking-water Quality. Vol. 1 : 3rd Ed.
01/25	Quantitative microbial risk assessment	
01/30	Water epidemiology	
02/01	Water epidemiology	
02/06	Epidemiology	
02/08	Excreta	Carr, Richard. 2001. Excreta-related infections and the role of sanitation in the control of transmission. In Water quality - Guidelines, standards and health: Assessment of risk and risk management for water-related infectious disease. Lorna Fewtrell and Jamie Bartram, Eds. Published on behalf of the WHO by IWA Publishing, London. Feachem, Richard, Bradley, David, Garelick, Hemda and Mara, Duncan. 1983. Sanitation and Disease: Health Aspects of Excreta and Wastewater Management. Chichester: John Wiley and

		Sons for the World Bank. PDFs: Chapter One | Chapter Two | Chapter Three Mackenbach, Johann P. 2007. Sanitation: pragmatism works. *British Medical Journal* 334:s17. Sanitation Connection
02/13	Excreta	Montgomery, Maggie A, and Menachem Elimelech. 2007. Water And Sanitation in Developing Countries: Including Health in the Equation. *Environmental Science and Technology* 41(1): 17-24. Petterson, S.A. and Ashbolt, N.J. 2003. WHO Guidelines for the Safe Use of Wastewater and Excreta in Agriculture: Microbial Risk Assessment Section. Document prepared for the World Health Organization, Geneva, Switzerland, 36 pp. Should ecological sanitation carry a health warning?: Assessing the health risks of ecological latrines.
02/15	Excreta	
02/20	Excreta Also	
02/22	Water Class discussion questions	Birks R, Hills S. 2007. Characterisation of Indicator Organisms and Pathogens in Domestic Greywater for Recycling. *Environmental Monitoring and Assessment.* Online 7 February 2007.
02/27	Water (revised 03/01/2007)	
03/01	Water	
03/06	Water	
03/08	Water	

03/13	Spring Break	
03/15	Spring Break	
03/20	Water	EPA. 1986. Ambient Water Quality Criteria for Bacteria - 1986. WHO. 2003. Faecal pollution and water quality. From Guidelines for safe recreational waters. Volume 1 - Coastal and fresh waters. http://www.epa.gov/beaches/
03/22	Water	Sobsey, MD. 2002. Managing Water in the Home: Accelerated Health Gains from Improved Water Supply. WHO. (online edition) - also applicable to 03/08 lecture Sample Exams: One | Two | Three Professor Duncan Mara's presentations on Wastewater Use in Agriculture (Requires Internet Explorer.)
03/27	Hygiene	
03/29	Hygiene	
04/03	Hygiene	Curtis V. 2003. Talking dirty: how to save a million lives. *International Journal of Environmental Health Research* 13: S73-S79 Curtis V, Cairncross S. 2003. Effect of washing hands with soap on diarrhoea risk in the community: a systematic review. *The Lancet Infectious Diseases* 3: 275-281
04/05	Hygiene	Bloomfield SF, Stanwell-Smith R, Crevel RWR, Pickup J. Too clean, or not too clean: the Hygiene Hypothesis and home hygiene. *Clinical and Experimental*

		Allergy, 36: 402–425. Cozad A, Jones RD. 2003. Disinfection and the prevention of infectious disease. *Am J Infect Control* 31: 243-54. Larson E, Aiello A, Lee LV, et.al. 2003. Short- and long-term effects of handwashing with antimicrobial or plain soap in the community. *Journal of Community Health* 28(2): 139-150. Sickbert-Bennett EE, Weber DJ, Gergen-Teague MF, et.al. 2005. Comparative efficacy of hand hygiene agents in the reduction of bacteria and viruses. *Am J Infect Control* 33: 67-77. Stanwell-Smith R. 2003. The infection potential in the home and the role of hygiene: historical and current perspectives. *International Journal of Environmental Health Research* 13: S9-S17. Webb AL, Stein AD, Ramakrishnan U, et.al. 2006. A simple index to measure hygiene behaviors. *International Journal of Epidemiology* 35:1469-1477.
04/10	Hygiene	Hadley C. 2004. Should auld acquaintance be forgot. *EMBO reports* 5(12): 1122-1124. Strachan D. 1989. Hay fever, hygiene and household size. *BMJ* 299: 1259-1260. Strachan D. 2000. Family size, infection and atopy: the first decade of the “hygiene hypothesis”. *Thorax* 55(Suppl 1):S2–S10.
04/12	Hygiene	
04/17	Air	Climate Change and Human Health -

		Risks and Responses Climate Change Futures: Health, Ecological and Economic Dimensions Inside The Greenhouse: The Impacts Of CO_2 And Climate Change On Public Health In The Inner City
04/19	Flex time for group projects or special topics	
04/24	Presentations	Alia Khan, Jennifer Espiritu, Leslie Arney, Tina Lusk: The Effects of Global Warming on WSH in the Developing / Underdeveloped World. Presentation | Handout
04/26	Presentations	Sara Abdoulayi, David Hostler, Stacey Succop, and Sarah Wilkins: Public-Private Partnerships: A Handwashing and Hygiene Promotion Example. Presentation | Handout Patrick Keller, Aye Otubu, Alex Doyal, Adam Froyum Roise: Avoiding Diarrhea: Epidemiology and Prevention
05/04	Final Exam due	Take-home exam
*Each of the main topics will be divided into the following units: 1) Health Risk 2) Exposure Pathways 3) Control measures/strategies		

Grading: Individual assignments (2) 25%
Group assignment (1) 25%
Mid-term exam (in-class) 25%
Final exam (in-class or take-home) 25%