

Combating Infectious Disease

Experimental College: Spring 2012

Roadmap

MODULE 1 (Lecture 1 – 5): Transmission Identification of Malaria, Dengue, and Cholera

MODULE 2 (Lecture 6 – 20): Disease Intervention Toolbox

(Lecture 6 – 11): Engineering Methods & Water Resource Systems

(Lecture 12 – 16): Epidemiology Methods

(Lecture 17 – 20): Statistical Methods

MODULE 3 (Lecture 21 – 26): Health Intervention Implementation

Roadmap

1/19	<p style="text-align: right;">Thursday, Lecture 1</p> <p>Introduction to the course Icebreakers Course objective: interdisciplinary problem-solving Core assignment: strategy design</p>
1/24	<p style="text-align: right;">Tuesday, Lecture 2</p> <p>Introduction to Malaria</p> <p>Readings Due:</p> <ul style="list-style-type: none"> Guerin, Philippe J., Piero Olliaro, Francois Nosten, Pierre Druilhe, Ramanan Laxminarayan, Fred Binka, Wen L. Kilama, Nathan Ford, and Nicholas J. White. "Malaria: current status of control, diagnosis, treatment, and a proposed agenda for research and development." <i>Lancet</i>. 2. (2002): 564-73. Newton, Paul, and Nicholas White. "Malaria: New Developments in Treatment and Prevention." <i>Annual Review of Medicine</i>. 50. (1999): 179-92.
1/26	<p style="text-align: right;">Thursday, Lecture 3</p> <p>Introduction to Dengue</p> <p>Readings Due:</p> <ul style="list-style-type: none"> Rigau-Pérez, José G., Gary G. Clark, Duane J. Gubler, Paul Reiter, Eduard J. Sanders, and A Vance Vorndam. "Dengue and dengue haemorrhagic fever." <i>Lancet</i>. 352. (1998): 971-77. Scott, Thomas W. and Amy C. Morrison. "Longitudinal Field Studies Will Guide a Paradigm Shift in Dengue Prevention." <i>Vector Biology, Ecology, and Control</i>. (2010): 139-61.
1/31	<p style="text-align: right;">Tuesday, Lecture 4</p> <p>Introduction to Cholera</p> <p>Readings Due:</p> <ul style="list-style-type: none"> Longini Jr., Ira M., Nizam Azhar, Mohammad Ali, Mohammad Yunus, Neeta Shenvi, and John D. Clemens. "Controlling Endemic Cholera with Oral Vaccines ." <i>PLoS Medicine</i>. 4.11 (2007): 1776-83. Reidl, Joachim and Karl E. Klose. "Vibrio cholerae and cholera : out of the water and into the host." <i>FEMS Microbiology Reviews</i>. 26. (2002): 125-39.
2/2	<p style="text-align: right;">Thursday, Lecture 5</p> <p>DEBATE DAY: Will warmer climates increase water-related disease as predicted empirically, or will our advances in public health and medicine keep disease at bay?</p> <p>Readings Due:</p> <ul style="list-style-type: none"> Gething, Peter W., David L. Smith, Anand P. Patil, Andrew J. Tatem, Robert W.

	<p>Snow, and Simon I. Hay. "Climate change and the global malaria recession." <i>Nature</i>. 465. (2010): 342-45.</p> <ul style="list-style-type: none"> • Hales, Simon, Neil de Wet, John Maindonald, and Alistair Woodward. "Potential effect of population and climate changes on global distribution of dengue fever: an empirical model." <i>Lancet</i>. 360. (2002): 830-34. • Lipp, Erin K., Anwar Huq, and Rita R. Colwell. "Effects of Global Climate on Infectious Disease: the Cholera Model." <i>Clinical Microbiology Reviews</i>. 15.4 (2002): 757-70.
2/7	<p style="text-align: right;">Tuesday, Lecture 6</p> <p>Problem-Solving in Engineering</p> <p>Readings Due:</p> <ul style="list-style-type: none"> • Jonassen, David, Johannes Strobel, and Chwee Beng Lee. "Everyday Problem Solving in Engineering: Lessons for Engineering Educators." <i>Journal of Engineering Education</i>. 95.2 (2006): 139-51.
2/9	<p style="text-align: right;">Thursday, Lecture 7</p> <p>Engineering Sustainability</p> <p>Readings Due:</p> <ul style="list-style-type: none"> • Choguill, Charles L. "Ten Steps to Sustainable Infrastructure." <i>Habitat International</i>. 20.3 (1996): 389-404. • Singleton, David and Nicole Hahn. "Sustainable poverty alleviation - changing role for engineers." <i>Proceedings of the Institution of Civil Engineers</i>. 157. (2004): 37-42.
2/14	<p style="text-align: right;">Tuesday, Lecture 8</p> <p>Public Health Engineering</p> <p>Readings Due:</p> <ul style="list-style-type: none"> • Gute, David M. "Public Health Engineering: Water as a Focus in Restoring the Connection between Engineering and Public Health." <i>Journal of Water Resources Planning and Management</i>. (2004): 425-28.
2/16	<p style="text-align: right;">Thursday, Lecture 9</p> <p>GUEST LECTURE: Malaria & Engineering Methods Invited: Dr. Elfatih Eltahir, MIT Department of Civil and Environmental Engineering</p> <p>Today: You will be split into three teams and receive your assigned disease, which will be the focus of your midterm and final papers. A detailed assignment sheet and grading rubric will also be made available for your midterm paper.</p>
2/21	<p style="text-align: right;">Tuesday, Lecture 10</p> <p>DEBATE DAY: What water-related interventions should be given priority in the global public health and engineering communities?</p> <p>Readings Due:</p>

	<ul style="list-style-type: none"> Mintz, Eric, Jamie Bartram, Peter Lochery, and Martin Wegelin. "Not Just a Drop in the Bucket: Expanding Access to Point-of-Use Water Treatment Systems." <i>American Journal of Public Health</i>. 91.10 (2001): 1565-70. 	
2/23	No Class: Tufts Monday	
2/28	<p>GUEST LECTURE: Water Resource Systems Invited: Dr. Kenneth Strzepek, MIT Center for Global Change Science</p>	Tuesday, Lecture 11
3/1	<p>Introduction to Epidemiology: Concepts and Tools</p> <p>Readings Due:</p> <ul style="list-style-type: none"> Gute, David M. and N. Bruce Hanes. United States. <i>Applied Approach to Epidemiology and Toxicology for Engineers</i>. Cincinnati, OH: Center for Disease Control and Prevention, 1993. 	Thursday, Lecture 12
3/6	<p>GUEST LECTURE: Cholera Invited: Dr. Stephen Calderwood, MGH Division of Infectious Disease</p> <p>Due Today: Mid-Term Paper</p>	Tuesday, Lecture 13
3/8	<p>Spatial Epidemiology Case Study Discussion: Cholera in Bangladesh</p> <p>Readings Due:</p> <ul style="list-style-type: none"> Ali, Mohammad, Michael Emch, J.P. Donnay, Mohammad Yunus, and R.B. Sack. "The spatial epidemiology of cholera in an endemic area of Bangladesh." <i>Social Science and Medicine</i>. 55. (2002): 1015-24. Ostfeld, Richard S., Gregory E. Glass, and Felicia Keesing. "Spatial epidemiology: an emerging (or re-emerging) discipline." <i>Trends in Ecology and Evolution</i>. 20.6 (2005): 328-36. 	Thursday, Lecture 14
3/13	<p>Seasonality Discussion: How can disease seasonality be used in the development of disease intervention programs?</p> <p>Readings Due:</p> <ul style="list-style-type: none"> Grassly, Nicholas C., and Christophe Fraser. "Seasonal infectious disease epidemiology." <i>Royal Society</i>. 273. (2006): 2541-50. 	Tuesday, Lecture 15
3/15	<p>Mathematical Epidemiology</p> <p>Readings Due:</p> <ul style="list-style-type: none"> Diekmann, O. "Mathematical Epidemiology of Infectious Diseases." <i>Images of SMC</i> 	Thursday, Lecture 16

	<i>Research</i> . (1996): 201-07.	
3/20	No Class: Spring Break	
3/22	No Class: Spring Break	
3/27	Statistical Modeling of Infectious Disease Logistic Regression Modeling Readings Due: <ul style="list-style-type: none"> Hethcote, Herbert W. "Mathematics of Infectious Diseases." <i>Society for Industrial and Applied Mathematics</i>. 42.4 (2000): 599-653. (Skim Thoroughly) Prentice, R. L. and R. Pyke. "Logistic disease incidence models and case-control studies." <i>Biometrika</i>. 66.3 (1979): 403-11. 	Tuesday, Lecture 17
3/29	Early Detection of Infectious Disease Discussion: How can early detection of disease be used in the development of disease intervention programs? Readings Due: <ul style="list-style-type: none"> Farrington, C.P., N.J. Andrews, A.D. Beale, and M.A. Catchpole. "A Statistical Algorithm for the Early Detection of Outbreaks of Infectious Disease." <i>Journal of the Royal Statistical Society: Series A (Statistics in Society)</i>. 159.3 (1996): 547-63. 	Thursday, Lecture 18
4/3	Roles of NGOs vs. GOs in Health Interventions Readings Due: <ul style="list-style-type: none"> Lorgen, Christy Cannon. "Dancing with the State: The Role of NGOs in Health Care and Health Policy." <i>Journal of International Development</i>. 10. (1998): 323-39. Akukwe, C. "The Growing Influence of Non Governmental Organisations (NGOs) in International Health: Challenges and Opportunities." <i>Journal of the Royal Society</i>. 118.2 (1998): 107-15. 	Tuesday, Lecture 19
4/5	GUEST LECTURE: Dengue & Genomics Invited: Dr. Matthew Henn, Broad Institute of MIT & Harvard	Thursday, Lecture 20
4/10	Planning Cost-Effective Health Interventions Case Study Discussion: WHO Readings Due: <ul style="list-style-type: none"> Murray, Christopher J.L., David B. Evans, Arnab Acharya, and Rob M.P.M. Baltussen. "Development of WHO Guidelines on Generalized Cost-Effectiveness Analysis." <i>Health Economics</i>. 9. (2002): 235-251. Weinstein, Milton C., Joanna E. Siegel, Marthe R. Gold, Mark S. Kamlet, Louise B. 	Tuesday, Lecture 21

	<p>Russell. "Recommendations of the Panel on Cost-Effectiveness in Health and Medicine." <i>Journal of the American Medical Association</i>. 276.15 (1996): 1253-58.</p> <p>Supplemental Resource:</p> <ul style="list-style-type: none"> Briggs, Andrew H. "A Bayesian Approach to Stochastic Cost-Effectiveness Analysis." <i>Health Economics</i>. 8. (1999): 257-61. <p>Today: "Alternative Strategies" – Debate Teams Assigned</p>	
4/12	<p>No Class Today: Take this time to work on your final paper and final debate strategy.</p> <p>Today (By Email): A detailed assignment sheet and grading rubric will be made available for your final paper.</p>	Thursday, Lecture 22
4/17	<p>GUEST LECTURE: Cost of Illness and Cost-Effectiveness of Treatment Case Study: Influenza Invited: Dr. Stan N. Finkelstein, MIT Engineering Systems Division</p>	Tuesday, Lecture 23
4/19	<p>Private-Public Partnerships Case Study Discussion: WHO</p> <p>Readings Due:</p> <ul style="list-style-type: none"> Buse, Kent and Andrew Harmer. "Power to the Partners?: The politics of public-private health partnerships." <i>Development</i>. 47.2 (2004): 49-56. Buse, Kent and Amalia Waxman. "Public-private health partnerships: a strategy for WHO." <i>Bulletin of the World Health Organization</i>. 79. (2001): 748-54. <p>Supplemental Resource:</p> <ul style="list-style-type: none"> Reich, Michael R. Ed. <i>Public-Private Partnerships for Public Health</i>. Cambridge, MA: Harvard Center for Population and Development Studies, 2002. VII-205. 	Thursday, Lecture 24
4/24	<p>DEBATE DAY: Alternative Strategies</p> <p>Readings Due:</p> <ul style="list-style-type: none"> Brown, L. David and Darcy Ashman. "Participation, Social Capital, and Intersectoral Problem Solving: African and Asian Cases." <i>World Development</i>. 24.9 (1996): 1467-79. 	Tuesday, Lecture 25
4/26	<p>DEBATE DAY: Continued</p>	Thursday, Lecture 26

Assignments

Short Pop Quizzes (10% total)

When: At random, at the start of any given class

Assignment: You will give a 1-2 minute oral synopsis to the class of a reading due the day of the quiz.

Each of you will be called on at least once during the term. The message here is clear: do the readings!

Informal Debates (15% total)

When: As designated, for the full block

Assignment: Debate prompts for the informal debates are listed in the syllabus. You will be assigned a “perspective” on the prompt in the class immediately prior the debate and are expected to argue and defend this perspective on debate day against your classmates.

Class Discussions (10% total)

When: As designated, after lecture

Assignment: Please come prepared to class with well-formulated thoughts on that day’s assigned reading. The class discussion topics will pertain to the readings. Contribution is mandatory.

Midterm Research Paper (20%)

When: As designated, by 11:59 PM via email

Assignment: You and your strategy design team will be assigned one of the three hot topic diseases. The goal of this research paper is to gain significant depth of knowledge on your disease, including but not limited to: microbiology; transmission; pathology; affected populations; and empirical prevention methods.

Formal Debate: “Alternative Strategies” (15%)

When: As designated, for the full block

Assignment: Three intervention/implementation strategies for a pressing global health problem have been proposed to the World Health Organization. You will be divided into one of three teams – one representing each strategy. The teams will have two weeks to prepare for this formal, end-of-term debate. Because a significant length of time is provided for preparation, research and strength of arguments and defenses will be graded more critically than those of the informal debates. A debate format and grading rubric will be provided upon assignment of teams.

Final Strategy Design Paper (30%)

When: Friday, May 4th, 2012, by 11:59 PM via email

Assignment: You and your strategy design team will construct an intervention and implementation scheme for your assigned disease in an affected region of your choosing. The two main goals of this paper are:

(1) Using your understanding of the disease as ascertained from lectures, assigned readings, and your midterm research papers to devise a realistic intervention strategy for mitigating the disease in your chosen population; and (2) using your understanding of health intervention implementation (i.e. NGOs vs. GOs; cost-effectiveness; and private-public partnerships) to devise a realistic implementation strategy for your intervention of choice.

Classroom Policies

Attendance

Attendance will be taken at the beginning of every class. Your presence in the class is absolutely essential to both your learning and your grade. Come to class!

- If you must miss class due to illness or an emergency, please contact your dean for the necessary paperwork to be waived from the attendance policy for this class as well as your other classes.
- If you must miss class for a personal reason (i.e. job interview; presentation at a conference; etc.), please contact me as soon as possible, and we can discuss your circumstances one-on-one.

Late Assignments

Every day an assignment is late, 10% will be deducted from the total.

Laptop Use

Laptops are permitted for note taking during lectures, but be warned! We will most often be sitting in a circle, and I have a propensity for walking while talking. Most importantly, stay engaged. Your participation in class should not be compromised by your laptop use.

Trunk

Readings and formal assignment descriptions – as well as grading rubrics when applicable – will be made available via Trunk. It is your responsibility to download these materials onto your computer (and print them if you would like).

Tip: Bring your readings to class every lecture so you can refer to them during discussions.

Office Hours

I am happy to meet with anyone to discuss course material and course work. Though I will not be enforcing regular office hours, if you contact me in advance via email, we can find a time slot that works for both of us.

Contact Information

email: Maimuna.Majumder@tufts.edu or maia.majumder@gmail.com

phone: 978-460-3677

Communication

Feel free to email me anytime with any concerns or difficulties, no matter how small the issue. The more you stay in touch, the more I know how to tailor the class to your needs!