EPID 9132 Epidemiology of Infectious Diseases Transmitted via Bodily Fluids

Instructor: Isaac Chun-Hai Fung, PhD, Georgia Southern University

Schedule (appendix to the syllabus), as of May 13, 2019

Disclaimer: As this course is offered the second time in JPHCOPH in Fall 2019, this schedule is purely suggestive and will be subject to frequent changes depending on the students' performance in this course.

Statistical software for the entire course: R & RStudio. Both are free to download and install. Students are expected to acquire a reasonable fluency in the R statistical language over the summer prior to this course. If students have not yet learned R, the instructor will be happy to point them towards online resources that they can use to learn R. The course involves a lot of computer programming in R. In the instruction of the course, the instructor will make sure that everybody will be brought up to speed with R.

Students are expected to work with their own laptop computers in class. If they do not have access to one, please check out a laptop computer from the library.

Week/Date	Topics
Part 1	**Network analysis in the context of sexually transmitted infections**
Week 1-2	**Introduction to network analysis** The instructor's own summary of *Social Networks and Health: Models, Methods, and Applications*, by Prof. Thomas W. Valente (ISBN-13: 978-0195301014) **Methods to collect social network data** **Review paper (most important):** Read JM et al. (2012) Close encounters of the infectious kind: methods to measure social mixing behaviour. Epidemiol. Infect. 140: 2117-2130. **Methodology research papers on contact diaries, surveys, and sensors (WREN, RFID, TelosB, Kinect)** Leecaster et al. (2016) Estimates of social contact in a middle school based on self-report and wireless sensor data. PLoS ONE. 11(4):e0153690. (contact diaries and WREN) Smieszek et al. (2012) Collecting close-contact social mixing data with contact diaries: reporting errors and biases. Epidemiol. Infect. 140: 744-752. (contact diaries) Smieszek et al. (2014) How should social mixing be measured: comparing web-based survey and sensor-based methods. BMC Infectious Diseases. 14:136. (survey and TelosB motes) Smieszek et al. (2016) Contact diaries versus wearable proximity sensors in measuring contact patterns at a conference: method comparison and participants' attitudes. BMC Infectious Diseases. 16:341. (contact diaries and RFID) Chen J et al. (2015) Using computer vision and depth sensing to measure healthcare worker-patient contacts and personal protective equipment adherence within hospital rooms. Open Forum Infectious Diseases. 3(1): ofv200. https://doi.org/10.1093/ofid/ofv200 (Kinect) A simple example of collection of self-reported contact data: Edge R, Heath J, Rowlingson B, Keegan TJ, Isba R (2015) Seasonal Influenza Vaccination amongst Medical Students: A Social Network Analysis Based on a Cross-Sectional Study. PLoS ONE 10(10): e0140085. doi:I0.1371/journal.pone.0140085
Week 1	
Aug 19 (M)	Lecture. Part 1
Aug 21 (W)	Lecture. Part 2
Aug 23 (F)	Discussion session

Week 2	
Aug 26 (M)	Discussion session
Aug 28 (W)	Discussion session
Aug 30 (F)	Review the materials with TA
Weeks 3-6	**Statistical analysis of network data with R** by Kolaczyk and Csardi, acronym: KC
Week 3	
Sep 2 (M)	**Labor day holiday – No class as specified in the University calendar**
Sep 4 (W)	KC: Chapter 2: Manipulating Network Data
Sep 6 (F)	KC: Chapter 3: Visualizing Network Data
Week 4	
Sep 9 (M)	Buffer slot. May use the time to arrange a meeting with department seminar guest speaker Dr. Penelope Howard of Emory University
Sep 11 (W)	KC: Chapter 4: Descriptive Analysis of Network Graph Characteristics
Sep 13 (F)	Review the materials with TA
Week 5	
Sep 16 (M)	KC: Chapter 5: Mathematical Models for Network Graphs
Sep 18 (W)	KC: Chapter 6: Statistical Models for Network Graphs
Sep 20 (F)	Review the materials with TA
Week 6	
Sep 23 (M)	KC: Chapter 6: Statistical Models for Network Graphs
Sep 25 (W)	Buffer slot: Review Materials learned so far. We may start network models here if possible.
Sep 27 (F)	Buffer slot: Review Materials learned so far.
Weeks 7 -11	**Network models** Teaching materials from Network Modeling for Epidemics workshop at the University of Washington (http://statnet.github.io/nme/index.html) used with written permission by Prof. Samuel Jenness of Emory University NME Module 1: Cross-sectional statistical network analysis: Exponential random graph models (ERGMs) for static networks NME Module 2: Dynamic statistical network analysis: separable temporal ERGMs (STERGMs) for dynamic networks NME Module 3: Simple disease transmission on dynamic networks: when network dynamics are independent of disease dynamics (Network dynamics #1) NME Module 4: Disease transmission on dynamic networks with feedback: when network and disease dynamics interact (Network dynamics #2) NME Module 5: Extending EpiModel for Research
Week 7	
Sep 30 (M) 9am	ERGM: d1-s6.pdf (lecture); d2-s1.pdf (lecture)
Sep 30 (M) Webinar 12.30pm	Modeling webinar: Viral within-host dynamics of HIV, HCV and influenza (tentative) by Ruian Ke, PhD, Los Alamos National Laboratory
Oct 2 (W)	STERGM Part 1: d2-s2.pdf (lecture)
Oct 4 (F)	Review the materials with TA
Week 8	
Oct 7 (M)	STERGM: Part 2: d2-tut1.r (R session)
Oct 9 (W)	Network dynamics #1: Part 1: d3-s1.pdf (lecture); d3-s2.r (R session); d3-s3.pdf (lecture)
Oct 11 (F)	Network dynamics #2: Part 2: d3-s4.r (R session); d3-s5.pdf (lecture)
Week 9	
Oct 14 (M) 9am	Career session: What I wish I would have learned when I was a doctoral student by Cristina Carias, PhD, Centers for Disease Control and Prevention

Oct 14 (M) Hendricks 3001 12.30pm	Modeling guest lecture: Forecasting the 2014 Ebola outbreak (tentative title) by Cristina Carias, PhD, Centers for Disease Control and Prevention
Oct 16 (W)	Network dynamics #1: Part 3: d3-s6.r (R session); d3-s7.r (R session) Self-study opportunity: d3-s8.pdf (suggested R code already uploaded to FOLIO)
Oct 18 (F)	Review the materials with TA
Week 10	
Oct 21 (M)	Network dynamics #2: Part 1: 2017 version: {d4-s1; d4-s2; d4-s3}
Oct 23 (W)	Network dynamics #2: Part 2: 2017 version: d4-s4
Oct 25 (F)	Review the materials with TA
Week 11	
Oct 28 (M)	Extending EpiModel: 2018 version: {d5-s3-model.r & d5-s3-module-fx.r}
Oct 30 (W)	Buffer slot: Extending EpiModel: 2018 version {d5-s1; d5-s2; d5-s5} (optional)
	Imputation of missing network data
Nov 1 (F)	Huisman M (2009). Imputation of missing network data: some simple procedures. Journal of Social Structure. Vol 10. Article No. 1 https://www.cmu.edu/joss/content/articles/volume10/huisman.pdf
Part 2	**Compartmental models of sexually transmitted infections and their applications**
Week 12 **(APHA week)**	The plan is that the following two session will be pre-recorded lectures and you can watch videos at home. No need to come to class.
Nov 4 (M)	**Application of mathematical modeling to address HIV intervention policy issues** **HIV intervention program among sex workers (Dr. Fung's MSc thesis)** Fung ICH et al. (2007) Modelling the impact and cost-effectiveness of the HIV intervention programme amongst commercial sex workers in Ahmedabad, Gujarat, India. BMC Public Health. 7:195. **Antiretroviral therapy (tentative)** Eaton JW et al. (2014) Health benefits, costs, and cost-effectiveness of earlier eligibility for adult antiretroviral therapy and expanded treatment coverage: a combined analysis of 12 mathematical models. Lancet Global Health 2:e23-34.
Nov 6 (W)	**Within-host models of HIV (Dr. Fung's PhD thesis)** **Part 1: The mathematical model** **Fung ICH***, Gambhir M, van Sighem A, de Wolf F, and Garnett GP (2010). Superinfection with a heterologous HIV strain *per se* does not lead to faster progression. Mathematical Biosciences. 224(1):1-9. [Original research article] DOI:10.1016/j.mbs.2009.11.007 **Part 2: Applications of the mathematical model** **Fung ICH***, Gambhir M, van Sighem A, de Wolf F, Garnett GP (2012). The Clinical Interpretation of Viral Blips in HIV Patients Receiving Antiviral Treatment: Are We Ready to Infer Poor Adherence? Journal of Acquired Immune Deficiency Syndrome (JAIDS). 60(1):5-11. [Original research article] DOI:10.1097/QAI.0b013e3182487a20
Nov 8 (F)	No CLASS – Students work on their research project
Week 13	
Nov 11 (M) Veterans Day	**Assignment 2: Manuscript critique presentation** **Submit the written manuscript critique**
Nov 13 (W)	**Assignment 1: Teach network analysis to MPH students in EPID 7135**
Nov 15 (F)	*Buffer slot if we cannot finish Monday session on time*
Week 14	
Nov 18 (M)	No CLASS – Students work on their research project
Nov 20 (W)	No CLASS – Students work on their research project
Nov 22 (F)	No CLASS – Students work on their research project
Week 15 Nov 19 & 21	**Thanksgiving Holiday – No Class**

Week 16	Dr. Fung may attend the Epidemics conference (Dec 3 – 6, 2019)
Dec 2 (M) Hendricks 3001 12.30pm	International Guest Lecture: Influenza Epidemiology By Benjamin Cowling, PhD, Professor & Division Head, Epidemiology & Biostatistics, The University of Hong Kong
Dec 4 (W)	NO CLASS – Students work on their research project
Dec 6 (F)	NO CLASS – Students work on their research project
Week 17 Dec 7-11	**Assignment 3: Research project presentation = Final Exam** **Exact time: see the University's announcements**

Notes: The network modeling materials used in this course are adapted from, or directly taken from here: http://statnet.github.io/nme/index.html. I have obtained the written permission from Prof Samuel Jenness of Emory University to use the materials in this NIH-supported workshop that he co-organized.