

PB HLTH 290 – Infectious Disease Modeling Seminar Fall 2020

Instructor: John Marshall

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Class hours: Wednesday 4-5pm, Zoom

Office hours: By appointment, Zoom

Synopsis: In recent years, mathematical models have greatly enhanced our understanding of the epidemiology of infectious diseases. In this seminar, we will review the fundamental concepts and classic papers in infectious disease modeling. We will then move on to current papers covering some of the latest developments in the field. Examples will be drawn from COVID-19, Ebola, Zika, HIV, malaria, and diseases and methods of particular interest to class members.

Class structure: The class will take the form of a journal club:

- First 10 minutes:
 - Powerpoint presentation by class member on the paper
 - Propose questions for small groups to discuss (usually 3 questions)
- Middle 20 minutes:
 - Class divides into 2 or 3 groups & discusses questions
- Last 20 minutes:
 - Groups report back what they discussed
 - General group discussion of the paper

When it's your week to present:

- Email the instructor (john.marshall@berkeley.edu) before the class leading up to yours with proposed questions for that week's paper
- Refine questions with instructor over the next 2 days
- Prepare a presentation for the first 10 minutes of class that week

Grading: Class presentation: 50%, Participation in discussion: 50%

Prerequisites:

- There are no prerequisites. This course is complementary to the practical course, "PH 252B Modeling the Dynamics of Infectious Disease Processes," held in the Spring. You can take these courses in either order.
- If you haven't taken PH 252B and don't have experience with infectious disease modeling, I would recommend reading the first 3 chapters of [Vynnycky & White \(2010\) "An Introduction to Infectious Disease Modelling"](#) (see bCourses).
- A 1-hour crash course in infectious disease modeling relevant to this seminar class will be held in the week of August 31st-September 4th.

Papers and presentation schedule:

- All papers & discussion questions will be uploaded to bCourses (papers asap, discussion questions the Friday before class).
- A possible sequence of papers is provided below with papers uploaded to bCourses.
- These are just recommendations. If you have any papers you'd like to see included, any methodology you'd like covered, or any infectious diseases you'd like included, please email the instructor by Monday 7th September.
- If there are any particular papers you'd particularly like to present, please email the instructor by Monday 9th September.
- The instructor will present the first and second papers (2nd & 9th September) and a draft schedule for the rest of the semester (papers and presenters) will be sent out on 9th September.

Date: **Paper (subject to change, dependent on student interests):**

#1. Sep 2 (John Marshall):

- [Bernoulli D & Blower S \(2004\) An attempt at a new analysis of the mortality caused by smallpox and of the advantages of inoculation to prevent it. Rev Med Virol 14: 275-288.](#)

#2. Sep 9 (John Marshall):

- [Granich RM *et al.* \(2008\) Universal voluntary HIV testing with immediate ART as a strategy for elimination of HIV transmission: a mathematical model. Lancet 373: 48-57.](#)

#3. Sep 16:

- [Kermack WO & McKendrick AG \(1927\) A mathematical contribution to the theory of epidemics. Proc Roy Soc London A 115: 700-721.](#)

#4. Sep 23:

- [Kucharski *et al.* \(2020\) Early dynamics of transmission and control of COVID-19: A mathematical modeling study. Lancet Inf Dis 20: 553-558.](#)

#5. Sep 30:

- [Kissler SM *et al.* \(2020\) Projecting the transmission of SARS-CoV-2 through the postpandemic period. Science 368: 860-868.](#)

#6. Oct 7:

- [Ferguson NM *et al.* \(2020\) Report 9: Impact of non-pharmaceutical interventions to reduce COVID-19 mortality and healthcare demand. Imperial College London COVID-19 updates.](#)
- [Ferguson NM *et al.* \(2006\) Strategies for mitigating an influenza pandemic. Nature 442: 448-452.](#)

#7. Oct 14:

- [Funk S *et al.* \(2019\) Assessing the performance of real-time epidemic forecasts: A case study of Ebola in the Western Area region of Sierra Leone, 2014-15. PLoS Com Bio 15: e1006785.](#)

#8. Oct 21:

- [Maxian O *et al.* \(2017\) Zika virus dynamics: When does sexual transmission matter? Epidemics 21: 48-55.](#)

#9. Oct 28:

- [Cauchemez S *et al.* \(2011\) Role of social networks in shaping disease transmission during a community outbreak of 2009 H1N1 pandemic influenza. Proc Natl Acad Scie USA 108: 2825-2830.](#)

#10. Nov 4:

- [Yakob L *et al.* \(2013\) *Clostridium difficile* exposure as an insidious source of infection in healthcare settings: An epidemiological model. BMC Infect Dis 13: 376.](#)

Nov 11: Veterans Day (Holiday)

#11. Nov 18:

- [Chen Q *et al.* \(2019\) Prevention of prescription opioid misuse and projected overuse deaths in the United States. JAMA Network Open 2: e187621.](#)

Nov 25: Thanksgiving (Holiday)

#12. Dec 2:

- [Ratmann O *et al.* \(2012\) Phylodynamic inference and model assessment with approximate Bayesian computation: Influenza as a case study. PLoS Comput Biol 8: e1002835.](#)

#13. Dec 9 (John Marshall):

- [Walker PW *et al.* \(2016\) Estimating the most efficient allocation of interventions to achieve reductions in *Plasmodium falciparum* malaria burden and transmission in Africa: a modelling study. Lancet Glob Health 4: e474-e484.](#)

Additional options:

- [Feng Z *et al.* \(2000\) A model for tuberculosis with exogenous reinfection. Theor Popul Biol 57: 235-247.](#)
- [Eaton *et al.* \(2015\) Assessment of epidemic projections using recent HIV survey data in South Africa: a validation analysis of ten mathematical models of HIV epidemiology in the antiretroviral therapy era. Lancet Glob Health 3: e598-e608.](#)