

**SUP 518: The Economics of Infectious Disease**

Fall 2020 – Last Updated 9/01/2020

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Office Hours: Wednesdays, 3:30–6 PM EST <a href="https://onlineofficehours.as.me/sup518">https://onlineofficehours.as.me/sup518</a>	<b>Course Assistant (CA): Mike Yepes, MPH</b>
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**Course Description**

The purpose of this course is to introduce the student to an economic perspective on the distribution and containment of infectious disease. Specific diseases will be discussed using recent research contributions from economists and public health officials. The special problems that infectious disease poses to free markets and governments will be highlighted.

**Prerequisites and Cross-Registration**

Prior experience with statistics and/or econometrics and/or microeconomics and/or infectious disease is helpful but not mandatory. Undergraduates may take SUP 518 as part of their economics concentration.

**Course and Communication**

Instruction will be offered via zoom. Updates will be posted via Canvas. All private communication should be done through your Harvard email address. Office hours will be on Wednesday after class.

**Academic Honesty and Integrity**

All students are expected to abide by the University policies on academic honesty and integrity as given in the Student Handbook.

**Honor Code**

In order to accommodate different challenges students may be facing during the pandemic, students will have flexibility to complete most of the requirements of the course in an asynchronous fashion. Students are expected to do work independently when instructed and abide by all assignment guidelines.

## Course Overview

Date (Class #)	Topic	Date (Class #)	Topic
9/2/2020 (1)	Introduction: Externalities and Public Policy	9/9/2020 (2)	Externalities continued
9/16/2020 (3)	Information Networks, Beliefs	9/23/2020 (4)	Demand for Healthcare Prices and Elasticity (Feedback Survey)
9/30/2020 (5)	Demand for Healthcare: Human Capital Model (Micro)	10/7/2020 (6)	Economic Epidemiology I <sup>s</sup>
10/14/2020 (7)	Economic Epidemiology II	10/21/2020 (8)	Economic Growth and Disease (Malthus)
10/28/2020 (9)	Human Capital (Macro)	11/4/2020 (10)	Subsidies and Private Public Partnership
11/11/2020	Veteran's Day	11/18/2020 (11)	Pharmaceutical Market <sup>s</sup>
11/25/2020	Thanksgiving	12/2/2020 (12)	Antibiotic Resistance

## Zoom Class Logistics

- Slides will be posted on day of lecture for use in following along in class. Classes are recorded during COVID-19.
- During class, chat will be monitored by the CA/Professor.  
Real-time clarifications from the CA/Professor in the chat function.
- Polls will be used for class engagement.
- 5-minute break in the middle of class to answer any questions/clarify concepts/stretch.

## Assignments

### Multiple Choice Assessments

- 11 assignments
- available on Canvas within 2 hours after class for the subsequent 24 hours
- Independent work per honor code
- ~50 points total (plan to drop lowest score)

### Short Answer Assignments

- 2 assignments
- covers material both in class *or* in readings
- *may* work with another classmate but must name partner and work with a *different* colleague for each assignment, will have one week to complete
- ~20 points total (§ in Overview indicates tentative due dates)
- Assignments due on 10/7/2020 at 11:59pm EST and 11/18/2020 at 11:59pm EST.
- Late assignments will not be accepted.

### Current Events/Research Assignments

- 3 assignments choose 1 news article or research article per assignment
- 1-3 page write up on how it relates to class
- Independent work per honor code
- ~30 points total
- Assignments due on or before 9/30/2020 at 11:59pm EST, on or before 10/31/2020 at 11:59pm EST and on or before 11/30/2020 at 11:59pm EST.
- Late assignments will not be accepted.

### Optional Final Presentation

- Up to 10 minutes in length.
- On a topic of their choice.
- More details on the topic later.

## **Readings (May Change) and Resources:**

Please attend to the codes and page numbers. Abbreviations NBER = National Bureau of Economic Research, WP = Working Paper.

Helpful references (online access via Hollis through the Emergency Temporary Access Service)

- *Mastering Metrics* by Josh Angrist and Jörn-Steffen Pischke
- *Health Economics* by Frank Sloan and Chee-Ruey Hsieh

### **1. September 2: Introduction**

Introduce/refresh definitions of economics, infectious diseases and epidemiology. Discuss welfare theorem and market failure inherent to communicable disease. Review the solutions to externalities.

#### Readings and Videos:

**Required:** Fauci, Anthony and David Morens, "The Perpetual Challenge of Infectious Disease," *New England Journal of Medicine*, 2012.

**Suggested for those with limited economics background:** Khan Academy [videos](#) on externalities

### **2. September 9: Externalities**

Discuss Rubin causal model and violation of SUTVA inherent in externalities. Understand how to measure externalities and review some examples.

#### Readings:

**Required:** Benjamin-Chung et al., "Spillover Effects in epidemiology parameters: study design and methodological considerations," *International Journal of Epidemiology* 2018, pp. 332-347

**Optional:** Banerjee, A.V., et al., "Improving Immunization Coverage in Rural India," *BMJ* 2010, pp. 1-9

**Optional:** Miguel, E. and Kremer, M., "Worms: Identifying impacts on education and health in the presence of treatment externalities," *Econometrica* 2004, 72: 159-217.

**Optional:** Chong et al., "Do Information Technologies Improve Teenagers' Sexual Education? Evidence from a Randomized Evaluation in Colombia," 2013, *NBER WP* 18776

**Optional:** Angrist J. and Pischke J., "Randomized Trials," *Mastering Metrics*, Chapter 1

### 3. September 16: Information and Networks

Discuss network externalities. Understand the role of networks in dissemination of behavior, information, contact tracing.

#### Readings:

**Required:** Kim et al., “Social network targeting to maximise population behaviour change: a cluster randomised controlled trial,” *Lancet* 2015

**Optional:** Goldberg J. and Macis, M., “Incentivized Peer Referrals for Tuberculosis Screening: Evidence from India,” *NBER WP* 25279

**Optional:** Shakya, H. et al., “Social network predictors of latrine ownership,” *Social Science and Medicine*, 2015, Vol. 125, pp. 129-138

### 4. September 23: Demand for Healthcare - Prices and Elasticity

Discuss price elasticity of demand for preventive healthcare services. Factors that influence elasticity discussed.

#### Readings and Videos:

**Required:** Dupas, P. “Health Behavior in Developing Countries,” *Annual Review of Economics* 2011. 3:425–49. [Only pages 425-434 are required reading.]

**Required:** Poverty Action Lab, “The Price Is Wrong,” April 2011 *Policy Brief*

**Suggested for those with limited economics background:** Khan Academy [videos](#) on price elasticity

**Optional:** Cohen, J. and Dupas, P., “Free Distribution or Cost-Sharing? Evidence from a Randomized Malaria Prevention Experiment,” *Quarterly Journal of Economics* 125(1), pp. 1-45, February 2010.

**Optional:** Ashraf, N. Berry, J. and Shapiro J., “Can Higher Prices Stimulate Product Use? Evidence from a Field Experiment in Zambia,” *American Economic Review* 100 pp. 2383–2413, December 2010

### 5. September 30: Human Capital Micro Model and Demand for Healthcare

Discuss more involved models of demand for health that incorporate a) Becker's view that time is also a constraint b) Family economics view that household's produce goods including health and that health is an input into the production of other goods.

Readings:

**Required:** Popkin, B., "A Household Framework for Examining the Social and Economic Consequences of Tropical Disease," *Social Science and Medicine*, 1982, vol. 16, pp. 533-543

**Suggested for those with limited economics background:** Chapter 3, *Health Economics*, Bhattacharya, Hyde and Tu

**Optional:** Sepehri, Ardeshir, "A Critique of Grossman's Canonical Model of Health Capital," *International Journal of Health Services*, 2015 45(4): 762-778.

## 6. October 7: Economic Epidemiology I

Describe and extend the SIR model of epidemiology to account for behavioral feedback. Discuss prevalence elasticity and recent models/implications for policy.

Readings:

**Required:** Tolles, J. and Luong, T. "Modeling Epidemics with Compartmental Models," *JAMA* 2020, 323(24): 2515-2516.

**Required:** Taylor, Paul (2020) "Susceptible Infected Recovered", *London Review of Books* 42(9) 7 May 2020 <https://www.lrb.co.uk/the-paper/v42/n09/paul-taylor/susceptible-infectious-recovered>

**Required:** Hauck, Katherine, "The Economics of Infectious Disease," *Oxford Research Encyclopedia of Economics and Finance*, 2018 [Only pages 1-14 are required.]

**Optional:** Chapter 21, *Health Economics*, Bhattacharya, Hyde and Tu

## 7. October 14: Economic Epidemiology II

Readings:

**Required:** Avery, et al., "Policy Implications of Models of the Spread of the Coronavirus: Perspectives and Opportunities for Economists," 2020 *NBER WP 27007*

**Optional:** Chapter 21, *Health Economics*, Bhattacharya, Hyde and Tu

## 8. October 21: Malthusian Dynamics

Introduction to Malthusian dynamics and positive check played by infectious disease.

Readings and videos:

**Required:** Hansen, G. and Prescott, E., "Malthus to Solow," *American Economic Review* 2002, 92 (4): 1205-1217.

**Optional:** Young, A., "Gift of the Dying: The Tragedy of AIDS and the Welfare of Future African Generations" *Quarterly Journal of Economics* 2005, 120(2) pp. 423-466.

**Suggested for those with limited economics background:** Khan Academy [videos](#) on population.

## 9. October 28: Human Capital Macro Model

Review the seminal contribution of MRW which extends Solow's growth model by including human capital.

Reading:

**Required:** Mankiw, G., Romer, D., and Weil, D., "A Contribution to the Empirics of Economic Growth," *Quarterly Journal of Economics* 1992

**Optional:** Bloom, D., Kuhn, M., and Pretzner K., "Modern Infectious Diseases: Macroeconomic Impacts and Policy Responses" NBER WP 27757

## 10. November 4: Subsidies and Financing

Return to correction of externalities, discuss Pigouvian taxes/subsidies. Discuss potential options for financing research and containment of infectious diseases. Importance of coordination.

Readings:

**Required:** Kates, J., and Wexler, A., "The Future of Global Financing for Infectious Diseases," in Halabi, S., Gostin, L, and Crowley, J., *The Global Management of Infectious Disease After Ebola* 2016, Chapter 8

**Required:** Klock, K. "International Public-Private Partnerships as Part of the Solution to Infectious Disease Threats" in Halabi, S. Gostin, L, and Crowley, J., *The Global Management of Infectious Disease After Ebola* 2016, Chapter 9

**Optional:** Goodkin-Gold, et al. ,“Optimal Subsidies for Prevention of Infectious Disease,” 2020 WP

## **11. November 18: Pharmaceutical Markets, Antibiotic and Vaccine Development**

Discuss organization of markets for pharmaceuticals and vaccines, with a focus on missing markets, incentives and patents. Discuss COVAX.

Readings:

**Required:** Sloan, F., and Hsieh, C., “Pharmaceutical Markets,” Chapter 9 in *Health Economics*

**Optional:** Kremer, M., et al., “Designing Advance Market Commitment for New Vaccines,” 2019 WP

## **12. December 2: Antimicrobial Resistance (AMR)**

The threat of AMR and its potential connection with Covid-19.

Readings:

**Required:** Hansen, G., “Antibiotic Resistance,” in Halabi, S., Gostin, L, and Crowley, J., *The Global Management of Infectious Disease After Ebola* 2016, Chapter 6

**Optional:** Alsan, Marcella, Nagamani Kammili, Jyothi Lakshmi, et al., “Poverty and Community-Acquired Antimicrobial Resistance with Extended-Spectrum  $\beta$ -Lactamase-Producing Organisms, Hyderabad, India,” *Emerging Infectious Diseases* 2018, 24(8): 1490-6.

**Optional:** “Antimicrobial resistance in the age of COVID-19,” *Nature Microbiology* 5, 779 (2020).

## **13. Date TBA: Wrap-up**

Discuss remaining content, address questions and review contemporaneous applications submitted by class.