Life Sciences 120: Global Threats to Health
Course Syllabus

The aims of this course are to explore some of the great threats to health in developing countries, to develop an appreciation for the multidisciplinary approaches required to understand them and conceive of novel strategies to combat them. The global threats include five major infectious diseases of developing countries --- pandemic ebola; cholera, dysentery and typhoid fever; tuberculosis, malaria and the looming emerging chronic disease threat of obesity and diabetes. Each of these has a unique mode of transmission and pathogenesis; each set will likely require new scientific knowledge to develop unique strategies for prevention and treatment. Yet understanding and combating them will demand a common set of disciplinary approaches and thinking, incorporating epidemiology, economic considerations, molecular biology and genetics, pathogenesis, drug discovery, immunology and vaccine development. To do so, the course will be taught in modules by outstanding experts on the faculty of the university and hospitals, with continuity provided by the course leaders and teaching fellows.

> *It is a profound and necessary truth that the deep things in science are not found because they are useful; they are found because it was possible to find them.*
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> *J. Robert Oppenheimer*

Prerequisites: Life Sciences 1a and 1b or LPSA.

Format: Two 1.5 hour lectures per week plus a weekly 75 minute-long section in which students will critically discuss current research from primary scientific literature. Attendance at all lectures and sections is required.

Lectures:	Tue, Thurs. 1:00-2:30 PM, Biolabs Room 1080
Section Times:	Thurs. 5:30 – 6:45
	Thurs. 7:00 – 8:15
	All sections in Biolabs Room 2062

Exams: Two hourly midterm examinations will take place over duration of the course.
Midterm Examination 1: Monday, March 5, 8PM in Biolabs room 2062
Midterm Examination 2: Thursday April 16, 1PM in Biolabs room 2062

Term paper: A 12-16 page paper will be due at the end of reading period (May 3, 2018). The term paper will give the students the opportunity to identify a global health threat of their choice not covered in lectures and carry out an analysis of the problem hopefully integrating each of the disciplinary approaches listed above and developed in the course, and propose innovative ideas for novel treatment, prevention or control strategy.

Grading: Course grades will be calculated based on the following breakdown:

Midterm Examination 1 - 20%
Midterm Examination 2 - 20%
Section Attendance/Participation - 20%
Final Paper - 40%

Office Hours: The professors of each module will be able to meet with students by appointment. Professor Bloom will have regular, weekly office hours on Wednesdays at 5pm at his home on 73 Francis Avenue, Cambridge, a couple of blocks from the Biolabs All members of the staff are also available to meet by appointment.

Course Schedule: Note that shading represents the thematic blocks covered in the course. Also, lecture titles may vary slightly from their original title below.

Date	Session	TOPIC	Teaching Team	Issues
Tue 1/23/18	1	**INTRODUCTION TO GLOBAL HEALTH THREATS**	Barry Bloom Richard Losick	Course Introduction: Scientific Challenges and Global Burden of Diseases
Thu 1/25/18	2	**HOST RESPONSES TO MICROBIAL THREATS**	Shiv Pillai	Innate, Acquired Antibody Responses and Cell-Mediated Immunity
Tue 1/30/18	3	**THE HEALTH OF POPULATIONS**	Marc Lipsitch	Epidemiology of Infectious Diseases: Basic Principles
Thu 2/1/18	4	**EPIDEMIC DISEASES-EBOLA**	Marc Lipsitch	Epidemiology of Epidemic diseases: Influenza and beyond
Tue 2/6/18	5		Caroline Buckee	Control of epidemic infectious diseases
Thu 2/8/18	6		Lindsey Baden	Vaccines and Drugs Against Ebola, Zika
Tue 2/13/18	7	**INTESTINAL INFECTIONS**	Ed Ryan	Epidemiology and Burden of Intestinal Infections including Cholera, Dysentery and Typhoid Fever
Thu 2/15/18	8		Cammie Lesser	Molecular Pathogenesis of Intestinal Infections, Part I
Tue 2/20/18	9		Cammie Lesser	Molecular Pathogenesis of Intestinal Infections, Part II
Thu 2/22/18	10		Yonatan Grad	The major problem of Antimicrobial Resistance
Tue 2/27/18	11	**SPECIAL SESSION**	Michael Van Rooyen	Global Health Epidemics and Emergencies.
Thu 3/1/18	12	**SPECIAL SESSION**	Rich Losick	The Biome
Tue 3/6/18		**TUBERCULOSIS**	Barry Bloom	Epidemiology of TB
Thu 3/8/18	13		Barry Bloom	Immunology of and Vaccines against TB
3/12/18 - 3/16/18		**SPRING BREAK VACATION**		
Tue 3/20/18	15		Sarah Fortune	Molecular Basis of Pathogenesis of TB

Thu 3/22/18	16		Eric Rubin	Drugs and New Treatments for TB
Tue 3/27/18	17	**MALARIA**	Dyann Wirth	Malaria Epidemiology and Biology of the Parasite
Thu 3/29/18	22		Dyann Wirth	Molecular Basis of Pathogenesis and Drug Resistance
Tue 4/3/18	23		Daniel Neafsey	Evolutionary Impact on the Parasite and Host Genomes
Thu 4/5/18	25		Dyann Wirth	Strategies for Control of Malaria
Tue 4/10/18	18	**SPECIAL SESSION**	Julie Buring	Design and Analysis of Clinical Trials
Thu 4/12/18	22	**THE COMING EPIDEMIC OF OBESITY AND METABOLIC DISEASES**	Gokhan Hotamisligil	Interactions Molecular pathogenesis of metabolic diseases – obesity, diabetes, heart disease
Tue 4/17/18	23		Frank Hu	Epidemiology of Obesity and Diabetes: Gene-Environment
Thu 4/19/18	24		Suddha Biddinger	Molecular pathways and strategies to control diabetes
Tue 4/24/18	25		Walter Willett	How Obesity and Diabetes can be Controlled
4/26/18 - 5/2/18		**READING PERIOD**		
Thu 5/3/18		**TERM PAPERS DUE**		