

BIOLOGY OF GLOBAL INFECTIOUS DISEASES & its intersection with Public Health

FEBRUARY 21-03 MARCH, 2017



Jawaharlal Nehru University

INVITED FACULTY



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**PRE
REGISTRATION
REQUIRED**

For pre-registration apply online at
<http://www.gian.iitkgp.ac.in> &
<http://gianregister.jnu.ac.in>

COURSE FEES

Students

JNU(M.Sc)	Free
JNU(Ph.D) & Other	1000

Indian

Faculty/Scientists	1000
Company	5000

Foreign

Company	US \$	400
SARC	US \$	250

OBJECTIVE:

This course is designed for graduate students and faculty who have a strong background in biology and an interest in infectious diseases and public health. Infectious diseases know no boundaries yet the burden falls disproportionately on low and middle income countries, including India. The course will provide an overview of the infectious diseases of high importance to the global burden of disease, and will tackle topical issues for each of them, going beyond biology to include practical issues such as social and economic ramifications. In addition to lectures, pre-selected topics will be explored in group discussions, and trainees will work in groups to present evidence based debates/panel discussions on topics of interest. Finally, two sessions will be held for faculty attending to discuss challenges and benefits of active learning methods.

TOPICS INCLUDE: The Global Burden of Disease, smallpox eradication influenza vaccines and pandemics, malaria, HIV, TB emergence of Zika & Ebola, diarrheal disease and leishmaniasis.

At the end of the course the student should be able to evaluate the contribution of different infectious diseases to the global burden of disease, and to propose relevant biological and non-biological control efforts.

WHO SHOULD ATTEND: Honors, Under-graduate (final year) & Graduate (MS & Ph.D.) students in Life Sciences, Biotechnology Biochemistry, Microbiology & Immunology, Molecular Biology Pharmaceutical sciences, Pharmacology, Biology & other allied disciplines.

Faculty & Research Scientists in Life Sciences Biotechnology, Biochemistry, Biology Microbiology & Immunology, Molecular Biology Pharmaceutical sciences, & other allied disciplines.

R&D personnel from Pharmaceutical & Biotechnology companies & Contract Research Organizations.

Biology of Global Infectious Diseases and its intersection with Public Health

Tuesday Feb. 21-Thursday March 3 9.30 am – 1.30 pm, Convention Center Lecture Hall 2

Marilyn Parsons, Ph.D., Professor, Center for Infectious Disease Research and Affiliate Professor of Global Health, University of Washington

Dr. Parsons is a parasite cell and molecular biologist, who has worked primarily at the level of fundamental biology but has branched into collaborative drug discovery studies. She teaches at the graduate and undergraduate level at the University of Washington, and previously collaborated with Dr. Madhubala on a multiyear NIH training project that included multiple workshops in India.

Course Overview

This course is designed for graduate students and faculty who have a strong background in biology and an interest in infectious diseases and public health. Infectious diseases know no boundaries yet the burden falls disproportionately on low and middle income countries, including India. The course will provide an overview of the infectious diseases of high importance to the global burden of disease, and will tackle topical issues for each of them, going beyond biology to include practical issues such as social and economic ramifications. In addition to lectures, pre-selected topics will be explored in group discussions, and trainees will work in groups to present evidence-based debates on topics of interest. Finally, since the course will use active learning techniques, two sessions will be held for faculty attending to discuss challenges and benefits of active learning methods.

At the end of the course the student should be able to:

- Evaluate the contribution of different infectious diseases to the global burden of disease
- Describe issues affecting their incidence, and consequences of infection
- Propose relevant biological and non-biological control efforts
- Appreciate various approaches to understanding and control of diseases that impact global health

Requirements: Readings will be assigned prior to each session. In addition students will need to be able to find and read papers and reports online. Students will be expected to attend and contribute in class (e.g., audience response, discussions) and participate in a debate. Students who fulfill these requirements will receive a certificate of course completion. To receive a “with distinction” certificate, they would also submit a short paper on the panel topic. More details on the paper will be provided.

Students will be divided into groups of ~4 people for discussions and debates. We will endeavor to have a mix of people at different levels and from different backgrounds in each group.

Typical in class discussion format

- Each group will be assigned one of two topics to prepare to discuss.
- Before-class: Go on the web and find scientific, political, economic, ethical information pertinent to the topic. These should be drawn primarily from scientific papers, or governmental, U.N., and NGO formal reports. Please do not use blogs or newspaper articles unless that is most relevant to your topic

(e.g., late-breaking news; examples of public reactions, etc). To simplify the work involved, your group may wish to divide up the areas to be covered. Prepare a short written document summarizing at least two key points in a few sentences (indicate sources) to bring to class (copies for your group + Prof and TA).

- First 20 min: discuss among yourselves, organize your knowledge and arguments
- Next 20 min: mix groups half and half to discuss. Choose a scribe to take notes. Choose a person to report to class on the outcome.
- Last 10 min: report to class

Debates: Students will work in groups of ~4 to prepare a debate about a controversial issue related to infectious disease and public health. This will require reading and research beyond the papers assigned for class. Debates will be presented during class time, with follow-up questions from the audience. More detailed instruction on the debate format will be provided.

Schedule

Inauguration on Monday Feb. 20, Convention Center Lecture Hall 2

Day 1: Tuesday Feb. 21

Introduction: Course format and active learning

Lecture 1: Global Burden of Diseases

After completing the readings and participating in lecture students should be able to: Define key terms are used in measuring of disease impact; describe how the GBD data are obtained and their limitations; identify top communicable causes of morbidity and mortality worldwide; and describe how the pattern of diseases differs between countries, as well as drivers of change in disease patterns.

Group meetings: introductions and expectations, exchange contact info, choose an organized person to help keep you on track, review the debate topics and think about your own ideas – 30 min

Tea break

Lecture 2: Eradication: smallpox

After completing the readings and participating in lecture students should be able to: Outline how adaptive immunity is stimulated by infection and vaccine, and how the smallpox vaccine protects against disease; describe characteristics of smallpox virus and disease that facilitated its eradication; and extrapolate the keys to success to other infectious diseases

Day 2: Wednesday Feb. 22

Lecture 3: Vaccine-preventable diseases: Influenza

Group meeting: decide on your debate topic. Plan to discuss with Dr. Parsons.

Tea break

Discussion 1: how can the world and India prepare for the next influenza pandemic?

Group A) How will we know a pandemic is happening? What is the natural history of a pandemic?
Group B) What preparations should be made on a practical level? Who should receive priority for treatment? What will happen to the business sector?

After completing the readings and participating in lecture/discussion students should be able to: describe influenza, its complications, treatments, and impact; explain the unique features of the agent that causes influenza and how that impacts disease; evaluate the process by which influenza is currently controlled and areas for improvement; assess the likelihood of control or elimination of influenza.

Day 3: Thursday Feb 23

Lecture 4: Vector-borne diseases: Malaria

After completing the readings and participating in lecture/discussion students should be able to: Described malaria infection, with special attention to children, compare the primary prevention and treatment interventions currently used, describe how antimalarial resistance develops, and explain how the biology of *Plasmodium* presents opportunities and difficulties in controlling the disease.

Tea break

Discussion: The explosion of Ebola and Zika

Group A: focus on Zika

Group B: focus on Ebola

Examples of topics to consider: Why did these diseases recently re-emerge? How should these diseases be fought from a public health point of view? What are the long term consequences of infection?

Day 4: Friday Feb. 24

Lecture 5: HIV

After completing the readings and participating in lecture/discussion students should be able to: : describe the natural history of HIV infection and their linkage to susceptibility to other diseases and transmission; explain how the HIV life cycle results in viral variation, and in turn impacts persistence, drug resistance, and vaccine challenges.

Group meetings: discuss your debate topic

Tea break

Lecture 6: Tuberculosis

After completing the readings and participating in lecture/discussion students should be able to: Explain why the collision of HIV/AIDS and TB is so powerful at the population and individual level, relate the concept of TB latency to disease spread and treatment, compare and contrast the evolution of MTb and Plasmodium drug resistance, summarize the BCG vaccine's strength and limitations.

Day 5 Monday Feb 27

Lecture 7: Diarrheal Disease

Group meetings: discuss your debate topic

Tea break

Discussion: What is the best means to combat severe malnutrition?

Group A: the role of immunizations, food supplementation and antibiotics

Group B: water quality, latrines (practical aspects), ethical and social justice concerns

Both groups should focus on science and also on barriers to implementation in India. What are potential solutions?

After completing the readings and participating in lecture/discussion students should be able to:

Describe the impact diarrheal diseases worldwide and the key causative agents; describe how diarrhea is treated; explain the short and long term consequences of chronic diarrhea and why infections of the GI tract affect nutrition; propose actions to reduce diarrheal diseases, and consider barriers to implementation; propose means of evaluating the role of the human microbiome in modulating outcomes.

Day 6 Tuesday Feb. 28

Lecture 8: Neglected diseases: Leishmaniasis

After completing the readings and participating in lecture/discussion students should be able to: Outline the epidemiology of Leishmaniasis and knowledge gaps concerning transmission; identify gaps in our knowledge in how the parasite lives within the mammalian host and causes disease; discuss why it is difficult to target *Leishmania* with drugs

Group work on debates

Day 7 Wednesday March 1

Debates

2 debates

Tea break – 15 min

2 debates

Day 8 Thursday March 2

Debates, continued

2 debates

Tea break

2 debates

Some suggested debate topics:

- Should we mount a campaign to eradicate measles now? Or should we stay focused on polio?
- Where should research dollars go: honing HIV treatment, or pursuing cure and developing vaccines?
- Should patients with drug-resistant TB be quarantined?
- Is vaccination of girls the best approach to combating cervical cancer?
- Should antibiotics be outlawed in animal feed?
- How should pregnancy and family planning be handled in areas with Zika outbreaks?
- Should neglected diseases receive research and implementation funding even though the global burden of each disease is low?
- Does the microbiome play a role in the increasing incidence of obesity?
- You are welcome to come up with another topic of your choice (or modify one of these). Your group will need to present both sides of the question. Please consult with Dr. Parsons.

Faculty discussion sessions (dates to be determined)

F1. What does research tell us about active learning and its effectiveness? What are the barriers?

F2. How can we involve students in their own learning process? Techniques and challenges.