

Syllabus

Living in the Microbial World

11:680:101; 3 credits

Living in the Microbial World is a lecture course for undergraduates with little or no science background. There are no prerequisites for the course.

Course Summary

This course examines the impact of the microbial world on humankind. Students will be introduced to microorganisms from the beginning of life on a young and very different earth than we see today and follow the evolutionary journey that has shaped the modern world. The course is divided into three general areas of microbial impact:

1. The diversity of the microbial world.
2. The impact of microbes on human health.
3. The economic impact of microbial products and processes.

Students will assess news media coverage of current issues in microbiology and from insights gained in the course be able to evaluate future issues using a critical scientific approach. Through lecture, cases studies and panel discussion students will probe social issues and concerns relevant to the field of microbiology including disease, antibiotic resistance, the ubiquity of microbial products, the value of probiotics, and **man-made microorganisms**. **The course considers humankind's** exploitation of the microbial world including production of microbial food products, antibiotic/drug production, agriculture, bioremediation, and bioterrorism.

Textbook: There is no textbook for the course so it is important to keep your lecture notes up-to-date. Reading material, lecture guides and homework assignments will be posted on SAKAI. Students will purchase a book chosen for review from the course bibliography.

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Course Learning Outcome Goals

Students in this course will:

1. Understand the diversity of microbial communities and how they impact humans and the environment.
2. Develop scientific literacy and learn conversational microbiology so students may critically analyze and discuss current issues in microbiology knowledgeably.
3. Evaluate media coverage of events germane to microbiology using the scientific method and critical scientific analysis.

SAS Core Curriculum Learning Goals



- I: 21st Century Challenges
 - c. Analyze the relationship that science and technology have to contemporary social issues.
- II: Areas of Inquiry
 - A: Natural Sciences
 - e. Understand and apply basic principles and concepts in the physical and biological sciences.
 - g. Identify and critically assess ethical and societal issues in science.

Grading Requirements:

The course grade will be based on three exam and three assignments as follows:

1. Portfolio of weekly newspaper periodical reports:	10@ 5 pts each	50 PTS
2. Book Review	1 @ 50 pts	50
3. Position paper	1 @ 50 pts	50
4. Exams	3 @ 50 pts	150
TOTAL		300 POINTS

Assignments

It is required that your work be in line with Rutgers University standards of academic integrity (<http://academicintegrity.rutgers.edu/academic-integrity-policy>). Citations and references must be used appropriately. I recommend that you use the APA format. Use the link provided to the Purdue University Online Writing Lab (OWL) for guidance: <https://owl.english.purdue.edu/owl/section/2/>. All assignments will be submitted through SAKAI using Turnitin.com, a plagiarism check.

1. Portfolio of weekly newspaper periodical reports:

Each news media article critique included in the portfolio will follow the template questions provided on SAKAI. Topics of articles critiqued should represent at least 5 different course topic areas shown below.

1. Evolution & Microbial Diversity
2. Microbial Communities & The Human Microbiome
3. Microbes in the Environment
4. Infectious Disease & Prevention
5. Dual Use & Bioweapons
6. Microbial Products

No more than three articles from a single course topic area may be included.

Article critiques will be due in two sets of 5.

2. Book review:

Students will choose from the bibliography provided on page 5 of syllabus. Acquiring the book is your responsibility.

Your review should include the following:

- **SUMMARY:** Discussion of major microbiological/scientific themes and ideas presented in the book. Your summary should reflect an understanding of the science covered and be organized and follow a logical flow
- **AUTHOR:** Provide a discussion of the author's background and qualifications.
- **CRITIQUE:** Your thoughts and reaction to the book including your reactions to the subject of the book, the author's position, how well it is written and overall success or failure of the book. Please indicate whether you recommend the book and for which audience the book appropriate.

3. Position paper:

The position paper will be a 1-2 page paper addressing **one** of the following statements. Consider the question/statement provided on each topic, choose one and **take a position**. The topics listed below are supported with readings in the "Resources Folder" on SAKAI & lecture notes. Specifically appropriate references may be found in the "**Position Paper**" folder. You are required to find at least one more appropriate support document independently. Your position must be supported by appropriate and carefully cited references.

1. **Dual use:** Research altering the structure of infective viruses poses a threat to man and should be banned.
2. **The Human Microbiome project:** Is the high cost of the human microbiome project justified by the outcome?
3. **Antibiotics and antimicrobial agents:** An international agency must be established to reduce the worldwide overuse of these agents.
4. **Vaccination:** Routine vaccination should not be required by law and suspension of routine vaccinations should be considered until it is clearly established there is no link to autism.

- 1. Evolution & Microbial Diversity**
- 2. Microbial Communities & The Human Microbiome**
- 3. Microbes in the Environment**
- 4. Infectious Disease & Prevention**
- 5. Dual Use & Bioweapons**
- 6. Microbial Products**

LITMW FALL 15 LECTURE SCHEDULE

Lecture Topics
Introduction to the Course – Assignments and Expectations
Microbes and the Microbial World
Cells, Viruses & How They Work
The Microbial Genome
Bioinformatics
Evolution and the Phylogeny of Life on Earth
Microbial Diversity
The Extremophiles; Life without Oxygen
Microbes in the Environment
Microbes & Architecture
Microbial Communities (Quorum Sensing TED TALK); Soil Fertility and Composting;
The Human Microbiome
Maintaining and Replenishing the Gut Microflora
Maintaining and Replenishing the Gut Microflora
Controlling Microbial Growth
Disease, Infection & the Immune System
Epidemiology
Person to Person Transmission
Person to Person Transmission (STIs) & Vectorborne Diseases
Food Safety and Foodborne Disease
Water Safety & Waterborne Disease
Vaccination
Dual Use & Forensic Microbiology
Industrial Microbiology & Microbial Products
Biotechnology; Bioremediation
Climate Change & Microbes

Bibliography

1. **Alcabes, Philip**. 2009. *Dread: How Fear and Fantasy Have Fueled Epidemics from the Black Death to Avian Flu*. Public Affairs, New York, NY..
2. **Beckwith, J**. 2002. *Making Genes, Making Waves*. Harvard University Press, Cambridge, MA.
3. **Ben-Barak, Idan**. 2009. *The Invisible Kingdom*. Basic Books, New York, NY. **
4. **Blaser, Martin J**. 2014. *Missing Microbes*. Henry Holt and Co., New York, NY.
5. **Carroll, Michael**. 2004. *Lab 257*. Harper, NY.
6. **Fenn, Elizabeth A., Pox Americana The Great Small Pox Epidemic of 1775-82**. 2001. Hill and Wang, New York, NY.
7. **Johnson, Steven**. 2006. *The Ghost Map: The Story of London's Most Terrifying Epidemic and How It Changed Science, Cities and the Modern World*. Penquin Books Ltd. London, England.
8. **Krasner, R. I**. 2008. *20th Century Microbe Hunters*. Jones and Bartlett Publishers, Sudbury, MA.
9. **Lewin, Alex**. 2012. *Real Food Fermentation*. Quarry Book, Beverly, MA.
10. **Lowenfels, J & W. Lewis**. 2011. *Teaming with Microbes: The Organic Gardener's Guide to the Soil Food Web*. Timber Press, Portland OR.
11. **Oshinsky, David**. 2005. *Polio: An American Story*. Oxford University Press, New York, NY.
12. **Offitt, P. A**. 2005. *The Cutter Incident: How America's First Polio Vaccine Let the Growing Vaccine Crisis*. Yale University Press, New Haven, CT.
13. **Offitt, P. A**. 2007. *Vaccinated*. HarperCollins Publishers, New York, NY.
14. **Offitt, P. A**. 2010. *Deadly Choices*. Basic Books, A Member of the Perseus Books Group, NY.
15. **Preston, Richard**. 2002. *The Demon in the Freezer*. Ballantine Books, NY.
16. **Quammen, David**. 2012. *Spillover*. W. W. Norton & Company, New York, NY.
17. **Quammen, David**. 2014. *Ebola*. W. W. Norton & Company, New York, NY. **
18. **Quammen, David**. 2015. *The Chimp and the River*. W. W. Norton & Company, New York, NY. **
19. **Rothbart, Harley**. 2008. *Germ Proof Your Kids: The Complete Guide to Protecting (without Overprotecting) Your Family from Infections*. ASM Press, Washington, DC.
20. **Salyer, Abigail and Dixie Whitt**. 2005. *Revenge of the Microbes: How Bacterial Resistance is Undermining the Antibiotic Miracle*. ASM Press, Washington, DC.
21. **Sherman, Irwin W**. 2006. *The Power of Plagues*. ASM Press, Washington, DC.
22. **Zimmer, Carl**. 2008. *Microcosm: E. coli and the New Science of Life*. Pantheon Books, NY.
23. **Zimmer, Carl**. 2011. *A Planet of Viruses*. The University of Chicago Press, Chicago, IL. **