

COURSE OVERVIEW:

Microbiomes 11:680:104

Spring semester

Cross-Listed with: Current Issues in Evolutionary Anthropology: Introduction to Microbiomes -01:070:297:01

CONTACT INFORMATION:

Instructor(s): Dr. Maria G Dominguez-Bello

Office Location: Dept. Biochemistry & Microbiology

Phone: Tel. 917-5651142

Email: mg.dominguez-bello@rutgers.edu

Office Hours: by appointment

COURSE WEBSITE, RESOURCES AND MATERIALS:

Textbook:

There is no textbook for this course, but lay public books on the microbiome will be recommended.

Articles on Microbiome, to discuss in class.

Examples of press articles:

NPR radio Rob Stein documentary: Exploring The Invisible Universe That Lives On Us — And In Us; 2013
<https://www.npr.org/sections/health-shots/2013/11/01/242361826/exploring-the-invisible-universe-that-lives-on-us-and-in-us>

Ed Yong's Introduction to the microbiome. National Geographic.

<https://www.nationalgeographic.com/science/phenomena/2010/08/08/an-introduction-to-the-microbiome/>

NYT: [Save the Germs](#)

NPR: [A Frozen Idea to Save Helpful Germs from Disasters](#)

Bloomberg: [Scientists Urge Doomsday Vault for 'Good' Germs](#)

The Guardian: [Build a 'Noah's Ark' for beneficial gut microbes, scientists say](#)

Inverse: [A Doomsday Vault for Seeds Isn't Enough; We'll Also Need One for Our Germs](#)

Examples of review and original articles:

- Ley, R. E., et al. (2008). "Worlds within worlds: evolution of the vertebrate gut microbiota." *Nat Rev Microbiol* 6(10): 776-788.
- Mueller NT, et al. *The infant microbiome development: mom matters. Trends in molecular medicine.* 2015;21(2):109-117.
- Dominguez-Bello MG and Blaser MJ. *Microbes as markers for migrations of individuals and human populations. Annual review of anthropology.* 2011;40:451-474.
- Ruiz-Calderon et al. *Walls talk: Microbial Biogeography of Homes Spanning Urbanization. Science Advances.* 2016; 2(2):e1501061-e1501061.
- Lozupone, C. A., et al. (2012). "Diversity, stability and resilience of the human gut microbiota." *Nature* 489(7415): 220-230.

COURSE DESCRIPTION:

This is a lecture course for students with minimal science background, including undergrads or graduate students from non-biological/health disciplines. There are no prerequisites for the course, which expects to attract students from natural sciences, health sciences, anthropology, sociology, engineering, urban studies, etc.

The course describes principles of host-associated microbes, how do humans acquire them, their functions, the terminology of ecological principles relevant to microbiomes (such as resilience, resistance, diversity and

stability). The general content includes principles of evolution of microbial life and hosts, symbioses, ecology, pathogens, degradation of the human microbiota and restoration potential.

There is basic level discussion of press releases and of review papers. The main focus of the course will be on the importance of host-associated microbes to health (mostly to humans) and the consequences of the impact of human activities and lifestyles on the microbiome diversity.

The course will consist on classes with discussion, including in depth discussion of a lay public article and of scientific reviews or original scientific work towards the end of the course.

The course provides a top-down approach to learning about the microbial world and host associated microbes, providing students with a level of understanding on the general trends associated with urbanization, including understanding the many antimicrobial practices of urban societies that are impacting the early transmission, colonization and engraftment of microbes in the body, and their consequences for normal immune development and later disease risks. The subject is of interests to the fields of anthropology, sociology, biology, mathematics, ecology, computational biology, engineering, urban planning, architecture, medicine, nutrition, agriculture, biotechnology and fields of science related to modernization and industrialization.

Reading assignments will include articles and review papers, or book chapters that will be discussed in class, and on which students will write a summary. The class discussion of the papers and the written summary will be part of the student evaluation.

There will be three midterm evaluations, of general knowledge at adequate level of the course.

Assessment plan. As I recall, this is needed for every new course proposal.

Course number and level. Course level is 100.

There will likely be some students who have taken Living in the Microbial World (100-level) who will be interested in this course.

To familiarize students with microbial ecosystems living on hosts

To read scientific research papers and critically present their content

LEARNING GOALS:

The course aims to inform students on why and how the microbiome is a new field of study, why is it important and how it is being degraded by an urban lifestyle. The course will familiarize students with the field, and enable them to understand science news about advances that reach mass media, as well as the abstract of scientific papers.

Students in this course will:

1. Understand the basic concepts and functions of host-associated microbiomes.
2. Develop scientific literacy to understand current news on microbiome advances, value of probiotics, of natural birth and natural exposures, and impacts of modern lifestyle.

ASSIGNMENTS/RESPONSIBILITIES, GRADING & ASSESSMENT:

First midterm evaluation	10%
Second midterm evaluation	20%
Third midterm evaluation	20%

Paper discussion/summary/panel

50%

Total

100%

ACCOMODATIONS FOR STUDENTS WITH DISABILITIES

Please follow the procedures outlined at <https://ods.rutgers.edu/students/registration-form>. Full policies and procedures are at <https://ods.rutgers.edu/>

Enter additional text here if you wish

ABSENCE POLICY

Students are expected to attend all classes; if you expect to miss one or two classes, please use the University absence reporting website <https://sims.rutgers.edu/ssra/> to indicate the date and reason for your absence. An email is automatically sent to me.

COURSE SCHEDULE:

Lecture	Date	Topic	Lecturer
1	Tue Jan 22	Introduction to the course	Dominguez-Bello
2	Thu Jan 24	Evolution of microbial life on Earth	Guest lecturer
3	Tue Jan 29	Symbiosis host-bacteria	Liping Zhao
4	Th Jan 31	Microbiome functions-	Dominguez-Bello
5	Tue Feb 5	Paper discussion microbiome 1	Dominguez-Bello
6	Th Feb 7	Paper discussion microbiome 2	Dominguez-Bello
7	Tue Feb 12	Paper discussion microbiome 3	Dominguez-Bello
8	Th Feb 14	Evaluation I (covers Lectures 1-7)	Dominguez-Bello
10	Tue Feb 19	Microbiome in early life	Dominguez-Bello
11	Thu Feb 21	Ecology: Niches, populations and communities	Guest lecturer
12	Tue Feb 26	Basic ecology principles in ecosystems (Richness, assembly of communities)	Dominguez-Bello
13	Thu Feb 28	Microbiome functions	Dominguez-Bello
14	Tue Mar 5	Microbiome functions- nutrition	Liping Zhao
15	Thu Mar 7	Microbiome and health	Dominguez-Bello
17	Tue Mar 12	Microbiome and health	Liping Zhao
16	Th Mar 14-22	SPRING BREAK	
17	Tue Mar 26	Microbiome and health	Dominguez-Bello
18	Th Mar 28	Evaluation II (covers lectures 10-16)	Dominguez-Bello
19	Tue Apr 2	Paper discussion microbiome 4	Liping Zhao
20	Th Apr 4	Paper discussion microbiome 5	Liping Zhao
21	Tue Apr 9	Paper discussion microbiome 6	Liping Zhao
22	Th Apr 11	Microbiome and diseases	Dominguez-Bello/ Liping Zhao
23	Tue Apr 16	Probiotics	Liping Zhao

24	Th Apr 18	Microbial anthropology- microbiome degradation	Dominguez-Bello
25	Tue Apr 23	Microbial anthropology- microbiome degradation	Dominguez-Bello
26	Th Apr 25	Pathogens – colonization resistance	Liping Zhao
27	Tue Apr 30	How to restore Health	Dominguez-Bello
27	Th May 3	Evaluation III (covers Lectures 1-27)	LZ 10

ACADEMIC INTEGRITY

The university's policy on Academic Integrity is available at <http://academicintegrity.rutgers.edu/academic-integrity-policy>. The principles of academic integrity require that a student:

- properly acknowledge and cite all use of the ideas, results, or words of others.
- properly acknowledge all contributors to a given piece of work.
- make sure that all work submitted as his or her own in a course or other academic activity is produced without the aid of impermissible materials or impermissible collaboration.
- obtain all data or results by ethical means and report them accurately without suppressing any results inconsistent with his or her interpretation or conclusions.
- treat all other students in an ethical manner, respecting their integrity and right to pursue their educational goals without interference. This requires that a student neither facilitate academic dishonesty by others nor obstruct their academic progress.
- uphold the canons of the ethical or professional code of the profession for which he or she is preparing.

Adherence to these principles is necessary in order to ensure that

- everyone is given proper credit for his or her ideas, words, results, and other scholarly accomplishments.
- all student work is fairly evaluated and no student has an inappropriate advantage over others.
- the academic and ethical development of all students is fostered.
- the reputation of the University for integrity in its teaching, research, and scholarship is maintained and enhanced.

Failure to uphold these principles of academic integrity threatens both the reputation of the University and the value of the degrees awarded to its students. Every member of the University community therefore bears a responsibility for ensuring that the highest standards of academic integrity are upheld.

STUDENT WELLNESS SERVICES

The Rutgers University Student Assembly urges that this information be included at the end of every syllabus. Edit or delete as you wish:

Just In Case Web App <http://codu.co/cee05e>

Access helpful mental health information and resources for yourself or a friend in a mental health crisis on your smartphone or tablet and easily contact CAPS or RUPD.

Counseling, ADAP & Psychiatric Services (CAPS)

(848) 932-7884 / 17 Senior Street, New Brunswick, NJ 08901/ www.rhscaps.rutgers.edu/

CAPS is a University mental health support service that includes counseling, alcohol and other drug assistance, and psychiatric services staffed by a team of professional within Rutgers Health services to support students' efforts to succeed at Rutgers University. CAPS offers a variety of services that include: individual therapy, group therapy and workshops, crisis intervention, referral to specialists in the community and consultation and collaboration with campus partners.

Violence Prevention & Victim Assistance (VPVA)

(848) 932-1181 / 3 Bartlett Street, New Brunswick, NJ 08901 / www.vpva.rutgers.edu/

The Office for Violence Prevention and Victim Assistance provides confidential crisis intervention, counseling and advocacy for victims of sexual and relationship violence and stalking to students, staff and faculty. To reach staff during office hours when the university is open or to reach an advocate after hours, call 848-932-1181.

Disability Services

(848) 445-6800 / Lucy Stone Hall, Suite A145, Livingston Campus, 54 Joyce Kilmer Avenue, Piscataway, NJ 08854 / <https://ods.rutgers.edu/>

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: <https://ods.rutgers.edu/students/documentation-guidelines>. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at: <https://ods.rutgers.edu/students/registration-form>.

Scarlet Listeners

(732) 247-5555 / <https://rutgers.campuslabs.com/engage/organization/scarletlisteners>

Free and confidential peer counseling and referral hotline, providing a comforting and supportive safe space.