MICROBIOMES & HEALTH Course #: 11:680:475

Offered: This is a lecture /seminar course which is offered each Spring semester.

Prerequisites and Registration Restrictions:
Pre-requisites: 11:680:390 General Microbiology, or equivalent.
For Pre-requisite overrides or Special Permission contact the Instructor.
Senior undergraduate students can also take this course.

Format: Two 1 hour 20 min lectures/seminars per week for 26 weeks

Description: Principles and methodologies for working on human microbiome. An overview on the role of microbiome in human health and disease. Conceptual framework and technologies for understanding how microbiome, particularly gut microbiome impact human health and well-being.

Topics covered: The concept of human superorganism; Ecological principles for understanding human microbiomes; Systems thinking and approaches for working on human microbiome; Bioinformatics and statistics tool kits for human microbiome research; Research strategy and experimental/trial design in microbiome study; From correlation to causality of human microbiome in chronic diseases; Nutrition and gut microbiome; Food processing and gut microbiome; Microbiome in pharmacology; Intergenerational, vertical transmission of human microbiomes; Horizontal transfer of human microbiomes; Microbiome and human adaptation/evolution; Microbiome and human society; Microbiome and Human-Nature relationship.

Course Book:
Reviews and research papers selected from current and classical literatures.
Will give lectures on various topics and hold discussions with the class.

Learning Goals: Students are expected to gain a fundamental understanding of how microbiome may impact human health and the tools and strategies for revealing and understanding such impacts; They are also expected to establish a conceptual framework to evaluate and digest new developments reported in scientific journals and news media.

Examinations: We will have two tests and two assays. the first test and one assay will cover the lectures by Dr. Dominguez-bello, the second test and one assay will cover the lectures by Dr. Liping Zhao. Each test will be 20% and each assay (1000 words at least) will be 30% of the total score of 100.

Additional Information: Instructors Dr. Liping Zhao (Rm. 326, Lipman Hall, phone 848-932-5675, email: liping.zhao@sebs.rutgers.edu), Dr. Maria Gloria Dominguez-bello (Rm.333B, Lipman Hall, phone: 848-932-5648, email: mg.dominguez-bello@rutgers.edu)

Graduate Special Topics Course: Know Your Microbiome
16:682:550:01 / Index 12827 (3 credits)

MICROBIOMES & HEALTH Course #: 11:680:475

Section: 01 **Roster:** 12 Students

Time: Mon Start: 3:55PM End: 5:15PM

Location: VIRTUAL

SPEC TOPICS MIC BIOL **Course #:** 16:682:550

Section: 01 **Roster:** 4 Students

Time: Mon Start: 3:55PM End: 5:15PM

Location: VIRTUAL

Graduate Special Topics Course: Know Your Microbiome 16:682:550:01
Syllabus:

Lecture 1, Introduction: human superorganism	M Gloria Dominguez-Bello	Jan Wed 20
Lecture 2, Evolution of microbiomes	M Gloria Dominguez-Bello	Jan Mon 25
Lecture 3, Microbiomes other than digestive	Guest: Tamar Barkay	Jan Wed 27
Lecture 4, Microbiome functions	M. Gloria Dominguez-Bello	Febr Mon 1
Lecture 5, Microbiome and Health	Guest: Martin Blaser	Febr Wed 3
Lecture 6, Microbiota transmission	M. Gloria Dominguez-Bello	Febr Mon 8
Lecture 7, Microbiota development	M. Gloria Dominguez-Bello	Febr Wed 10
Lecture 8, Microbiota functions in early life	M. Gloria Dominguez-Bello	Febr Mon 15
Lecture 9, Urbanization, microbiome and disease risks: microbial role	M. Gloria Dominguez-Bello	Febr Wed 17
Lecture 10, Microbiota perturbations: medical practices	M. Gloria Dominguez-Bello	Febr Mon 22
Lecture 11, Microbiota perturbations: hygiene and antibacterials	M. Gloria Dominguez-Bello	Febr Wed 24
Lecture 12, Human microbiota degradation: evidence consequences	M. Gloria Dominguez-Bello	Mar Mon 1
Lecture 13 Theoretical basis of sequence analyses	Guest: Jincheng Wang	Mar Wed 3
1st test (one hour)	M. Gloria Dominguez-Bello	Mar Mon 8
Lecture 14, Systems biology for human microbiome research	Liping Zhao	Mar Wed 10
SPRING BREAK		Mar Mon 15
SPRING BREAK		Mar Wed 17

Lecture 15, Causality in human microbiome research: Koch's postulates still apply	Liping Zhao	Mar Mon 22
Lecture 16, Multi-omics approach and data-mining strategy	Liping Zhao	Mar Wed 24
Lecture 17, Nutritional modulation of the gut microbiome for metabolic health: animal models	Liping Zhao	Mar Mon 29
Lecture 18, Nutritional modulation of the gut microbiome for metabolic health: human obesity	Liping Zhao	Mar Wed 31
Lecture 19, Nutritional modulation of the gut microbiome for metabolic health: human type 2 diabetes	Liping Zhao	Apr Mon 5
Lecture 20, Nutritional modulation of the gut microbiome for healthy longevity: animal models	Liping Zhao	Apr Wed 7
Lecture 21, Pharmaceutical modulation of the gut microbiome for metabolic health	Liping Zhao	Apr Mon 12
Lecture 22, The gut microbiome and host immunity: animal models	Liping Zhao	Apr Wed 14
Lecture 23, Are probiotic bacteria probiotic?	Liping Zhao	Apr Mon 19
Lecture 24, Can dietary fiber cause liver cancer?	Liping Zhao	Apr Wed 21
Lecture 25, Human microbiome research in nutrition: what's next?	Liping Zhao	Apr Mon 26
Guest lecture	TBD	Apr Wed 28
2nd test (one hour)	Liping Zhao	May Mon 3