

PROPOSED CATALOG DESCRIPTION:

Designator: AVS

Number: 254

Title: Introduction to Animal Microbiomes

Prerequisites: BIO 200 or BIO 208 or BMB 155 or BMB 280 or SMS 201; or instructor’s permission

Credit Hours: 3

Does it meet Service Learning?: No

Description: This course introduces students to host-associated microbiomes; the genomic collection of bacteria, archaea, fungi, protozoa, and viruses present in a host ecosystem. In each lecture, we will focus on an anatomical location, and discuss the host and environmental pressures which select for the resident microbial community. The material is primarily in animals (mammals, birds, fish, amphibians) but includes some human-specific comparisons. This course will introduce ecological theories (e.g. environmental selection, neutral theory) in the context of microbial communities, the history of host-associated microbiology, and how technology has contributed to or limited our understanding of organisms and their critical role in our health and development. The skill-set objectives include group discussions, reading scientific literature, and scientific writing in a variety of styles and both technical and non-technical formats.

REASON FOR NEW COURSE Please include updated catalog changes when submitting course

There is a need for courses which introduce students to microbial ecology, especially in the context of human and animal health, and there are currently no courses at UMaine which provide this. Research and industry have lately demonstrated a huge demand for host-associated microbiomes, and this course would prepare students going into the areas of animal or human health practice, health research, biomedical industry, and more. This course is anticipated to have broad appeal across Food and Agriculture, Microbiology, Biology, and Ecology.

Can this course be repeated for credit? No (If no please skip the next two questions)

If **YES**, total number of credits allowed: n/a If **YES**, total number of completions allowed: n/a

Can students enroll multiple times in term? n/a

Catalog Edits

Please include relevant catalog language here along with any edits that will be necessary with the addition of this course.

 YES, I have submitted catalog changes documenting how this new course will add to/change the degree requirements for any relevant majors/minors.

 X **NO**, this course will not be added to any lists of requirements, and therefore I have no submitted catalog changes for it.

COMPONENTS (TYPE OF COURSE/USED BY STUDENT RECORDS FOR MaineStreet)

Please check ONLY ONE box unless the proposed course will have multiple non-graded components:

Applied Music		Lecture	X
Clinical		Recitation	
Field Experience/Internship		Research	
Independent Study		Seminar	
Laboratory		Studio	
Service-Learning *			

*Refer to documentation on criteria for Service-Learning at: www.umaine.edu/upcc

OTHER SPECIFIC INFORMATION:

N/A

When will this course typically be offered? (Please Check all that Apply)

Fall	X	Alternating
Spring		
Summer		

Please explain how Student Learning Outcomes for the course as presented in the course syllabus align with the Student Learning Outcomes for the proposed general education category (Examples):

The proposed GenEd category for this course is Population and Environment, which require “students to understand how humankind interacts with our finite physical and biological environment”. As our understanding of microorganisms grows, we are also able to better understand ourselves and our natural world. Microorganisms are essential to life on this planet, and in the context of host-associated microorganisms, they allow us to gain nutrients from our diet, assist or evade our immune systems, and are essential to animal wellbeing. In addition, the microbial communities that live in or on animals are susceptible to environmental pressures or lifestyle choices, in the same way that natural ecosystems are.

To assess whether students are meeting these learning objectives, open-ended written assignments will be used, and students will be graded on the quality of presentation as well as their comprehension of the material. These formats (see Syllabus) require students to understand how microbial communities are linked to animal health and environmental conditions.

This course will fulfill the following Student Learning Outcomes Students for the Population and Environment category:

- “Recognize and understand the role of both local and global environmental change on the quality of human life,”
 - The microbial communities associated with animals can be susceptible to environmental changes, or can help us weather them. In each lecture, this course will teach students about the environmental pressures which naturally occur in different anatomical locations and how that selects for a microbial community, as well as how changes to that environment (such as disease or local climate conditions) can disrupt the microbial community and create problems for the host animal.
 - Learning objectives: Describe the dynamics which shape host-associated microbiomes; Describe how host-associated microbial ecosystems are affected by environmental (external to the body) conditions; Describe how climate change affects range and diet selection, and how this can impact gut microbial communities and animal survival; Describe vertical and horizontal transmission, as well as environmental exposure of microorganisms; Describe the effect of pollution and air quality on health and the microbiome.

- “Describe the influence of diverse factors, such as philosophical, cultural, religious, economic, educational, and political, on population growth and environmental quality,”
 - This course will teach students about how lifestyle factors (age, diet, physiological state, the use of antimicrobial toothpaste, etc.) affect host-associated microbiomes in animals, and how this can directly improve or deteriorate animal health. Many of our choices in diet, hygiene, or animal management are affected by cultural, religious, economic, education, or political motives, but all of these can affect microbial communities.
 - Learning objectives: Describe the dynamics which shape host-associated microbiomes; Describe how host-associated microbial ecosystems are affected by environmental (external to the body) conditions; Describe how climate change affects range and diet selection, and how this can impact gut microbial communities and animal survival; Describe vertical and horizontal transmission, as well as

environmental exposure of microorganisms; Describe the effect of pollution and air quality on health and the microbiome.

- *“Interpret diverse types of information about environmental issues, to develop their own perspectives on these issues, and to communicate these perspectives effectively,”*
 - This course will require students to read scientific literature and discuss recent advances in host-associated microbiomes. While humans will not be the focus of this course, much of what we learn about the microbial communities of other animals is directly translatable to humans, and several topics will be highly relevant, including the use of probiotics and ‘fad’ diets to create a healthy microbiome. In particular, we will discuss the ecological principles behind probiotics, and how current consumer products may not live up to their claims. The assignments for this course are primarily open-ended essays and short oral presentations, both of which teach students to take in a broad amount of information and be able to distill it down into succinct communications of science. In particular, non-technical communication formats will be included to help students learn to communicate science to a general audience.
 - Learning objective: Review scientific journal articles and distill their findings while understanding their limitations; Access online databases of scientific articles and databases.

- *“Understand and describe technical and/or scientific approaches for addressing problems that arise in the relationship between human population and the environment.”*
 - This course will require students to read scientific literature and be familiar the role of technology in our understanding of microbial ecology. It will also include discussions on how technology has shaped our understanding of science, and the technological changes facing scientists who study organisms which are incredibly difficult to detect and measure, and who do not obey the same ecological principles as macroorganisms. In addition to readings, students will have in-class discussions, and assignments will require them to present this information in open-ended written or short oral presentation formats.
 - Learning objectives: Review scientific journal articles and distill their findings while understanding their limitations; Communicate science in a variety of formats.

THIS SECTION MUST BE COMPLETED FOR GENERAL EDUCATION APPROVALS:

CHECK ALL AREAS FOR WHICH A COURSE IS PROPOSED* - Max. 2

Quantitative Literacy	
Lab Science	
Science Applications	
Western Cultural Traditions	
Population & Environment	X
Cultural Diversity or International Perspectives	
Artistic & Creative Expressions	
Social Context & Institutions	
Ethics	
Writing Intensive	
Capstone Experience	

*For information on General Education descriptions please see: www.umaine.edu/upcc

Please provide rationale for assigning a Gen Ed to this course:

The overall goal of this course is to teach students that humans, animals, and the environment are all connected by the flow of microorganisms, and to integrate the effects of environment, host lifestyle, and human management of

environment and animals into an understanding of that flow of microorganisms. This course will provide a base of knowledge in microbial ecology, and while it focuses on host-associated microbiomes in animals, could also be applied to host-associated microbiomes in plants or insects. Similarly, many of the basic principles here apply to environmental microbiology. After completed this course, students would be able to apply this knowledge to environmental, and especially soil, microbiology courses, human and animal health, and sustainable agriculture.

TEXT(S) PLANNED FOR USE: (if more room is needed please attach a separate page)

All texts will be provided as scientific journal articles available online through Blackboard. A current list can be found on the course syllabus, but will be updated yearly as needed to reflect up-to-date research.

COURSE INSTRUCTOR: (Include name, position and teaching load)

Dr. Suzanne Ishaq, Assistant Professor, 50% teaching

Are additional resources required for this course?:

No. The department will not request additional resources for this course, now or in the future, unless the request is accompanied by an explanation of how the increased funding or other support is to be provided.

Yes. Please list additional resources required and note how they will be funded or supported

Does the content of this course overlap significantly with other University courses? If so, list the course, explain the overlap, and justify the need for the proposed course.

There are currently no courses at UMaine which provide a body-system wide approach to host-associated microbiome curriculum. While some material may be partially provided in other courses, this course will provide a more holistic view of host, microbes, and health.

What other department/programs are affected? Have affected departments/programs been consulted? Any concerns expressed? Please explain:

In addition to students in the School of Food and Agriculture (primarily Animal and Veterinary Sciences and Nutrition and Food Sciences), the Microbiology, Biology, and Ecology departments may be affected. While this course does not overlap with anything currently offered in those departments, this course may be of interest to their students. I have consulted with faculty in Animal and Veterinary Science, Food Science and Human Nutrition, Plant and Soil Science, and Molecular and Biomedical Sciences to determine student and faculty interest, as well as any overlap in curricula. No concerns were expressed. Drs. Robert Causey, Jim Weber, Dave Marcinkowski, Juan Romero, Sue Sullivan, Pauline Kamath, and Edward Bernard as well as graduate student Stephanie Shea, expressed their support for this course.

Will offering this course result in overload salary payments, either through the college or DLL either to the instructor of this course or to anyone else as a result of rearranging teaching assignments? If yes, please explain:

No.