

DTU Environment
12134 Environmental Microbiology
Fall 2010 Module E2A 5 ECTS credit points

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Time: Monday 1 PM to 5 PM**Location:**

Lectures & Exercises: Building 116, Rm. 19
 Laboratory Projects: Building 115, Rm. 227/221 and Building 114, Rm. 037

Course Objectives

The overall objective of this course is to provide students with the introductory concepts, terms, and tools necessary to identify, describe, and analyse microbes, microbial interactions, and microbial processes as they might occur in environmental and engineered systems.

Learning Objectives

At the end of this course, students should be able to

1. describe, identify, and list the key distinguishing features of the major subgroups of both archaea and bacteria
2. list major biogeochemical cycles, identifying those reactions that are microbe-catalyzed
3. name, explain, and describe the core central metabolic and respiratory pathways in archaea and bacteria
4. use equilibrium thermodynamic expressions to estimate feasibility of various biochemical reactions
5. identify, apply, and interpret basic biokinetic expressions for microbial growth and interactions
6. illustrate and predict how various microbial processes are modulated by environmental conditions
7. describe, identify, list, and sketch the key processes and properties that govern microbial interfacial behaviour, with emphasis on the biofilm mode of life
8. describe and differentiate the various non-cellular 'life' forms (virus, plasmids, prions, etc) and the mechanism by which they are maintained and transferred in microbial communities
9. list and use the core concepts and terms relevant to public health microbiology
10. from simple system observations, analyze and describe the underlying governing microbial processes and interactions

Format

The course will comprise weekly lectures, take-home and in-class exercises, and weekly laboratory investigations. The laboratory projects will allow students to get hands-on experience of methods and concepts in environmental microbiology. Evaluation will occur by means of 1 project reports, 1 oral presentation and a final exam.

Textbook

Required textbook for this course is BBOM: Madigan, M. T.; Martinko, J. M. *Brock Biology of Microorganisms*; 12 ed.; Pearson Prentice Hall: Upper Saddle River, NJ, 2009. The textbook will be supplemented with some readings, which will be posted on CampusNet.

Lectures

Weekly lectures will take place in Bldg 115. Rm. 109. Normally there will be two lectures of approx. 1 hour per meeting period (from ca. 1 to 3 pm). The lectures will cover 9 main topics specified in syllabus, and will in large part support the readings assigned from BBOM or elsewhere. It is assumed that you have done the specified reading assignments prior to coming to class. Occasionally, there will be exercises during the lectures. These exercises will aim to master, reinforce, or extract key concepts of the various course topics. They may also be used to introduce quantitative treatment/application of the material, or help build the relationship between course material and environmental applications. Exercises may also be given as 'take-home' activity. Answers to exercises do NOT need to be returned, and – as a rule - solutions will not be posted. However, students are encouraged to seek advice from the instructors on how to solve them.

Pensum

As you can see from the course outline there are both 'required readings' and 'recommended readings'. The 'recommended readings' ARE NOT part of the pensum, however, they make the material interesting and their reading is encouraged. Please note that the PPT files, which will be posted on campusnet, and any other documents that will be posted on campusnet ARE part of the course pensum, unless specified otherwise.

Laboratory Projects

There are 2 laboratory projects, each lasting for half of the semester. Their aim is two-fold. First, they introduce real-life applications of environmental microbiology, and will familiarize you with traditional and contemporary methods used to answer questions in environmental microbiology. Second, they provide hands-on learning of several core concepts in environmental microbiology, and, thus, enhance or augment the classroom lectures. The laboratory investigations take place between ca. 3 and 5 pm in Bldg 115 Rm. 227/221 or Bldg 114 Rm. 037. You will be expected to be familiar with the information on the handouts provided and in the assigned textbook reading. You will be divided into several teams during week 1 for these investigations. You will need to obey standard laboratory guidelines during these visits. You will receive extensive guidance, and supporting documents, and one final team report/oral presentation must be submitted on each investigation.

On-line Resources

With purchase of BBOM, you will also have access to the companion web site. It offers many on-line resources, including web tutorials (animations), study guide, quizzes, and many web links to interesting microbiology relevant sites. We recommend that you use these resources to help you master the assigned material and track your progress. After you have registered, log in at www.prenhall.com/madigan.

What do I need to know to pass the final exam?

There are three main sources that should help you figure out what is important in this course. First, there are the instructional objectives: they list specifically what you should be able to do after each topic! Secondly, there are the assignments/exercises that you will periodically receive: they contain the type of problems or questions you should be able to master. Finally, in the required reading sections, you should be able answer all the 'concept checks'.

Office Hours

Wednesday 1-2 for short (5 to 10 min) consultations with BFSM or HANA. For longer meetings, please make appointment with the instructors or associated instructors.

Final Evaluation

Final grade will be calculated based on performance on team projects (25% written report due Oct. 25, 25% oral presentation Nov. 29) and a final written multiple-choice exam (50%).

"Chance favors the prepared mind", *attributed to* Louis Pasteur (1822-1895)