

Water Microbiology (3 credits)

001-2-5059

Weekly Lecture Hours	Exercise	Laboratory	Field Trip
3			

Course overview:

This course aims to provide a comprehensive overview of microorganisms in drinking water and wastewater environments. We will explore environmentally relevant processes including bioremediation of pollutants, wastewater treatment and pathogens monitoring in the environment. To that end we will describe various methods aimed at detection, identification and source tracking of pathogenic microorganisms. In addition, we will discuss biological wastewater treatment, biofouling, emergence of antibiotic resistance in natural environments, and the use of bacteria to detect pollutants and toxins.

Upper level undergraduate students in the departments of Biotechnology, Environmental Engineering and Life Sciences will gain expertise in microbial processes with an emphasis on their application to environmental control, disinfection and remediation. The aim is to provide in-depth understanding of the microbial role in water treatment and bioremediation, quality monitoring of water from different sources and different uses. In addition, I aim to equip the students with the tools needed to manage water quality effectively and familiarize them with the latest practical laboratory methods and techniques for the detection of indicators and pathogens in water.

Class activities will include lectures, discussions, case-studies, a writing project, oral presentation and a final home take exam.

Course format:

Lectures with supporting reading (review articles provided at the beginning of the course) will form the knowledge-base of the course.

Course outline:

- Water quality measures: guideline, methods, identification and validation.
- Enteric bacteria (indicators and pathogens)
- Opportunistic pathogens: Legionella, Vibrio, Pseudomonas and Staphylococcus
- Viruses: Polio, adenovirus, enterovirus, Rotavirus and norovirus
- Protozoa: Giardia, Cryptosporidium and Toxoplasma
- Pathogens source tracking and disinfection
- Aerobic and anaerobic wastewater treatment
- Sludge microbiology
- Microorganisms involved in foaming, bulking and membrane fouling
- Antibiotic resistance in natural systems
- Toxicity testing in water and wastewater using microorganisms
- Water quality, related environmental policies and practices around the world

Grading Components:

Discussions and case-studies 5%

Writing project and oral presentation 25%

Lab reports 30%

Final home take exam 40%

Lecturer: Osnat Gillor

Recommended Readings:

References will be given during the course.