

<b>Level:</b> PhD				
<b>Course title:</b> Water microbiology				
<b>Status:</b> elective				
<b>ECTS:</b> 15				
<b>Requirements:</b> none				
<b>Learning objectives</b> Advanced study of microbiological problems in water (biogeochemical cycles, role in bioindication, health significance for drinking water, metabolic activity in the biological treatment processes, legislation).				
<b>Learning outcomes</b> Expanded knowledge of the biological and microbiological characteristics of water, surface water and groundwater as potential water sources, the type and quality of drinking water, detection methods of microorganisms, new methods and techniques of examination, legislation, microorganisms as quality bioindicators and as active participants in the treatment processes of contaminated water.				
<b>Syllabus</b> <i>Theoretical instruction</i> The study of the hydrological cycle of water in nature, the problem of surface water. Microorganisms as indicators of pollution and active participants in the process of purification. The problem of sediment in natural watercourses and the problem of waste sludge disposal from biological treatment facilities. Groundwater - the abundance and distribution of bacteria in groundwater, the opportunities for biodegradation of human-induced contaminants, natural organic matter in groundwater and its impact on drinking water quality. Importance and control of iron bacteria and the problem of reduction of well specific yield. Commercial BART tests for the monitoring of groundwater microbiological quality. Activated carbon technology in drinking water treatment. Legislation and protection. Drinking water - the presence and functional role of microorganisms (viruses, bacteria, protozoa, algae, fungi). Metabolic diversity and biological significance of total and viable bacteria, adaptation to the low-nutrient environment. Pathogenicity of microorganisms, nonpathogenic microorganisms and opportunistic pathogens. Detection, and the new methods and techniques of examination. The implementation and effectiveness of disinfection procedures. Problem of biofilms and re-infection in the network. Scanning-electron microscopy. Legislation. The microbiological quality of bottled water. Wastewater - microorganisms in biological treatment processes - lagoons, activated sludge, activated carbon, wet fields (wetlands). Aerobic and anaerobic processes. Flocculated and granular activated sludge. Nitrifiers and denitrifiers in the metabolism of nitrogen compounds. Filamentous bacteria and the phenomenon of "sludge bulking", problem solving. Biological filtration. Biofilms of activated carbon in a tertiary water treatment, electron-microscopy, legislation.  <i>Practical instruction</i> follows the program of theoretical instruction.				
<b>Weekly teaching load</b>				Other:
Lectures: 5(75)	Exercises: -	Other forms of teaching: -	Student research: 5(75)	-