

EC 14-VII Basic Methods of Sanitary, Soil and Water Microbiology

Code	EC 14-VII
ECTS credits	4
Attendance time	8th Semester
Language of instruction	Ukrainian
Duration	1
Cycle	Each Winter Semester
Coordinator	Lectures, Iryna Rayevska
Instructor(s)	Lectures, Iryna Rayevska
Allocation of study programmes	Biology
Recommended prerequisites	Ecology of microorganisms, Sanitary microbiology, Laboratory research methods
Learning objectives	<ul style="list-style-type: none"> - regulatory documents used in sanitary microbiology, - immunological methods and techniques in microbiological practice, - technique of selection of biological material and express methods of identification and diagnosis of clinically and sanitary important and pathogenic microorganisms, - basic methods of soil and water microbiology, features of soil and water sampling for microbiological analysis, the most common methods of studying soil and water microorganisms.
Syllabus	<ul style="list-style-type: none"> • Methods of sanitary and clinical microbiology <p><u>Immunological methods in microbiology</u></p> <p>Corpuscular, soluble and erythrocyte diagnostics. Commercial diagnostics. Methods of agglutination reaction, hemagglutination</p>

reaction, microprecipitation reaction, indirect (passive) hemagglutination reaction, complement binding reaction, enzyme immunoassay, radioimmunoassay. Serotyping. Determination of phagocytic activity, phagocytic index, completion of phagocytosis. Vidal reaction, Wasserman reaction.

Selection of biological material and implementation of microbiological studies. Material selection technique for bacteriological research. Taking mucous secretions from the nose for testing for staphylococcus. Selection of pharyngeal mucus secretions. Sowing material. Preparation of differentiation tests and assessment of pathogenicity. Plasma coagulation reaction and lycetovittellase test. Phagotyping of staphylococci.

Sensitivity of microorganisms to antibiotics. Methods of studying microbial antagonism. Determination of sensitivity of staphylococci to antibiotics.

Fecal contamination of various environments and objects.

Sanitary control of various environments. Examination of faeces and environmental objects for bacteria of the Escherichia coli group. Determination of coli titer and coli index (E. coli) in food products. Indicators of the sanitary condition of the environment, objects, food, etc. Sanitary control of air, water, soil, food products (milk and dairy products, meat and sausages, confectionery, etc. GMP principles.

Diagnostic methods of clinically important and pathogenic bacteria.

Primary and secondary fermentation samples. Assessment of the quality of milk and dairy products: testing with methylene blue and resazurin. Determination of the total number of microorganisms. Determination of staphylococci and enterococci. API systems.

- Methods of soil and water microbiology.

Sampling of soil and water and their microbiological analysis.

Methods of selection and averaging of soil and water samples. Sampling from the depth of the reservoir and deep soil horizons. Bathometers and drills. Transportation and storage of samples.

	<p>Preparation of samples for chemical, biochemical and microbiological analysis.</p> <p><u>Determination of the speed of microbiological processes.</u> Principles of field and laboratory methods. Kinetic methods of assessment. Methods of determining the rate of photosynthesis and chemosynthesis, general soil activity (respiration), dark fixation of CO₂, aerobic and anaerobic destruction. Amylolytic, cellulolytic, proteolytic activity. Mobilization of phosphates. Determination of the activity of denitrification, nitrogen fixation, nitrification, methanogenesis and methane oxidation, sulfate reduction.</p> <p><u>Methods of research of water and soil bacteria.</u> Study of microbiocenosis of water and soil using elective environments. Vinogradsky's column. Counting the number of microorganisms on liquid and solid media. The main groups of soil microorganisms and indices of direction of microbiological processes.</p> <p><u>Research of soil micromycetes.</u> Principles of identification of the main representatives of soil micromycetes - Penicillium, Aspergillus, Trichoderma, Mucor, Absidia, Rhizopus, etc. Determination of phytotoxicity and cellulolytic activity of certain soil micromycetes. Determination of soil phytotoxicity.</p> <p><u>Research of soil algae.</u> Selection of soil samples for algological studies. Obtaining pure cultures of soil algae. Identification of algae.</p>
Literature	<p>Benson H.J. Microbiological Applications A Laboratory Manual in General Microbiology, 8th edition. – 2002. – 496 p.</p> <p>Moselio Schaechter Desk encyclopedia of Microbiology, 2th edition. – USA: ElsevierInc, 2009. – 1259 p.</p> <p>Duncan F. MCB 1000L Applied Microbiology Laboratory Manual, 4th edition. – 2005. – 70 p.</p> <p>Cappuccino J. G., Sherman N. Microbiology: A Laboratory Manual, 5th edition. – 1999. – 471 p</p>
Teaching and learning methods	Laboratory (6 WH)
Workload	Laboratory hours: 75 h

	Individual study time/preparation and postprocessing: 45 h Total: 120 h
Assessment	The assessment consists of written tests and oral interview
Grading procedure	The module grade is the sum of preliminary study achievements and the final test grade
Basis for	<ul style="list-style-type: none">• Biology, Metabolism and Systematics of Microorganisms• Ecophysiology of Plants and Microorganisms• Quality Control and Standards of Biological Products