HEALTH ECOLOGY	
GENERAL INFORMATION	
Course coordinator	Professor Maja Miškulin, MD, PhD
Assistant/Associate	Nika Pavlović, PhD
Study Programme	Integrated undergraduate and graduate university study of Medicine
Status of the course	Mandatory
Year of study, semester	6th year, 11th semester
ECTS	**3**
Workload (hours)	Lectures (20); Seminars (20)
Expected number of students	70
COURSE DESCRIPTION	
Course objectives	
To enable students to understand and interpret the impact of various environmental factors on the health of the population and the effective management of health risks arising from these impacts, all for the purpose of improving and preserving the health of the population.	
Enrolment requirements and entry competencies	
In accordance with the conditions for enrolment in the 6th year of this study program.	
Learning outcomes at the Programme level	
1.1., 1.2., 2.1., 2.2., 2.3., 3.1., 3.4., 3.5., 4.2.	
Learning outcomes (5-10)	
After the lectures, seminars, self-study and the passed exam students will be able: 1. To valorise the ecological concept of health and health-ecological standards. 2. To assess the possible health effects of environmental factors. 3. To judge the advantages and disadvantages of ecological research methods. 4. To compare the peculiarities of the action of different environmental toxins and to evaluate the dose-effect relationship. 5. To interpret the basic assumptions of environmental and biological monitoring and the role of risk analysis in protecting the health of the population from harmful environmental influences. 6. To evaluate the impacts of various environmental factors (chemical factors, physical factors, biological factors, psychosocial factors, water, food, air pollution, waste, soil, housing) on the health of the population. 7. To critically assess the impacts of global health and environmental problems on population health. 8. To determine the most important ethical issues in health ecology research.	
Course content	
Lectures Environment and health. Changes of the environment and human development. Health effects of environmental factors. Definition and tasks of health ecology. Ecological concept of health. Health-ecological standards. Development of ecological ideas in medicine. Historical development of ecological ideas in medicine. Historical development of health ecology in Croatia.	

Ecological anamnesis and examination. Reasons for taking an ecological anamnesis and its significance. Method of taking ecological anamnesis. Physical examination in case of suspicion of exposure to harmful effects of environmental factors.
Ecological research method. Basic characteristics of ecological research method. Types of ecological research methods. Advantages and disadvantages of ecological research methods.
Fundamentals of ecotoxicology. Modes of the entrance of ecological toxins into the body and their fate in the organism. Peculiarities of the ecological toxin's activity. Types of toxicity. Determination of the threat to health caused by ecological toxins. Dose-effect ratio.
Biological monitoring and biological markers. Environmental monitoring and biological monitoring. Objectives and tasks of biological monitoring. Features of the implementation of biological monitoring programs. National biomonitoring programs. Limitations of biological monitoring. Benefits of biological monitoring. Biological markers. Interpretation of the biomonitoring results. The future of biomonitoring.
Risk analysis in health ecology. Danger or harm. Risk. Risk analysis - definition and division. Risk assessment - definition, degrees, basic task. Risk management - definition, basic steps, role. Risk communication - definition and meaning.
Organization of health ecology in Croatia, current situation and perspectives. Legislative and institutional framework of health ecology in Croatia. Organization and work of health ecology in Croatia - assessment of the situation and perspectives.
Ethical issues in health ecology research. Basic ethical principles of all scientific research. Ethical doubts related to the detection and impact of toxic substances in the human environment on the health of the population. Ethical issues related to biomonitoring. New threats to scientific integrity during the conduction of health ecology research.
Seminars
Chemical factors of the environment. Toxic metals. Gases and vapours. Pesticides. Polycyclic aromatic hydrocarbons. Polychlorinated biphenyls. Dioxins and furans. Phthalates. Environmental mutagenesis. Environmental carcinogenesis. Environmental impact on reproduction.
Physical factors of the environment. Thermal factors. Atmospheric pressure. Electromagnetic radiation.
Biological factors of the environment. Biological factors in water. Biological factors in food. Biological factors in the air. Biological factors in soil.
Psychosocial factors of the environment. Socio-economic status. Education. Employment. Marital status and family. Housing and urbanization. Health and quality of health services.
Water and health. Water as a prerequisite for life and health on Earth. Available quantities of drinking water and water consumption. Types and characteristics of water in nature. Sources and types of water pollution. Water classification. Drinking water supply - water sources, protection of water sources, drinking water supply facilities, bottled water. Croatia and water. Drainage and wastewater treatment.
Air pollution and health. Air composition and atmosphere. Air pollution. Indoor air pollution. Effects of air pollution. Air quality control. Reduction of air pollution.
Waste management and health. Waste and human health. Collection, removal and final disposal of solid waste. Health waste.
Soil contamination and human health. Sources of soil pollution. Effects of soil contamination on health and routes of uptake. Reduction of soil pollution.
Housing and health. Housing functions. Determinants of healthy living. Sick building syndrome. Home accidents. Residential environment. Housing and global urbanization.
Food and health. Microbiological food contaminants and the HACCP system. Chemical food contaminants - nitrates, nitrites and N-nitrosamines, mycotoxins, toxic metals, pesticides, polycyclic

aromatic hydrocarbons, polychlorinated biphenyls and dioxins, veterinary drugs, histamine, food additives, acrylamide, melamine, bisphenol A, genetically modified organisms, and genetically modified food: sources, effects on human health.
Global health ecological issues. Global climate change. Ozone depletion. Greenhouse effect. Far-reaching transboundary air pollution. Transboundary movement of hazardous waste. Biodiversity. Ecological incidents and disasters. Natural disasters. Anthropogenic disasters. Ecological catastrophes in Croatia. Overcoming of ecological disasters.

Mode of teaching

Lectures; Seminars

Student obligations

Attending all types of classes is mandatory and the student is required to participate in all types of knowledge assessment. The student can be justifiably absent from 30% of each type of classes.

Monitoring student work *(alignment of learning outcomes, teaching methods and grading)*

Teaching activity	ECTS	Learning outcome	Student activity	Assessment methods	Grade points	
					Min.	Max.
Attending classes	0.1	1-8	Attendance at classes	Record	2	4
Seminars	0.9	6-7	Attendance and active participation in seminars by preparing a seminar presentation	Assessment of the quality of the seminar presentation	12	24
Final exam	2.0	1-8	Learning for the written exam	Written exam	36	72
Total	**3.0**				**50**	**100**

Evaluation of the final exam:

Percentage of accurate answers provided (%)	Grade points
60.00-64.99	36
65.00-69.99	42
70.00-74.99	47
75.00-79.99	52
80.00-84.99	57
85.00-89.99	62
90.00-94.99	67
95.00-100.00	72

Calculation of final grade:

The grade points accumulated during the classes will be added to the points achieved at the final exam. The grading will be done by absolute distribution, i.e. on the basis of the final results, and it will be compared to the numerical system in the following manner:
A – Excellent (5): 90-100 grade points; B – Very Good (4): 80-89.99 grade points; C – Good (3): 70-79.99 grade points; D – sufficient (2): 60-69.99 grade points; E – sufficient (2): 54.99 -59.99 grade points.

Required reading (available in the library and through other media)

Title	Number of copies in the library	Availability through other media
Puntarić D, Miškulin M, Bošnir J. Health ecology (in Croatian). Medicinska naklada, Zagreb, 2012.	10	

Additional reading

Published recent scientific research in the subject area.

Course evaluation procedures

An anonymous, quantitative, standardised student survey on the course and the teacher's work implemented by the Office for Quality of the Faculty of Medicine Osijek.

Note /Other

E-learning is not within the standard amount of the classes, but it is used in teaching and contains links to various pages, videos and audio materials available on the web pages.