Faculty of Medicine in Rijeka

Curriculum
2025/2026

For course

Health Ecology

Study program:	**Medical Studies in English (R)** University integrated undergraduate and graduate study
Department:	**Department of Health Ecology**
Course coordinator:	**izv. prof. dr. sc. Tomić Linšak Dijana, dipl. sanit. ing.**
Year of study:	**5**
ECTS:	**2.5**
Incentive ECTS:	**0 (0.00%)**
Foreign language:	**Possibility of teaching in a foreign language**

Course information:

The course offered by the Department of Health Ecology focuses on understanding the interrelationships between the environment and human health. Through an interdisciplinary approach, students are introduced to key concepts of ecological science, epidemiology, toxicology, and public health. The objective of the course is to equip students with the skills necessary to analyze and address issues that arise at the intersection of health and the environment.

Within the course framework, students investigate the impact of various environmental factors, including air, water, and soil pollution, on human health. Special attention is given to the analysis of specific diseases associated with ecological conditions, as well as strategies for their prevention and control. Through lectures, seminars, and practical exercises, students develop the necessary skills for conducting research and risk assessments.

In addition to theoretical knowledge, the course includes practical aspects such as field studies and case analyses. Students have the opportunity to participate in projects addressing current issues in the field of health ecology, allowing them to apply their acquired knowledge in real-world situations. The course also emphasizes the importance of interdisciplinary collaboration and communication among various sectors and professionals.

Ultimately, the course encourages critical thinking and analytical skills, enabling students to develop their own perspectives and solutions to challenges in the field of health ecology. Considering global changes and challenges such as climate change and urbanization, the course focuses on sustainable approaches and strategies that can enhance community health.

[Ishodi učenja]:

Upon successful completion of this course, students will be able to:

1. **Explain fundamental ecological principles**
   Describe the structure and function of ecosystems, including biochemical cycles, and understand the relationship between environmental factors and human health.
2. **Assess environmental pollution and its impact on health**
   Identify major sources and types of pollutants, explain their behaviour and persistence in the environment, and evaluate their effects on ecosystems and human populations.
3. **Analyse the influence of environmental changes on disease and genetics**
   Explain the role of environmental factors in the development of diseases, including the impact of climate change and pollutants on infectious diseases and genetic material, as well as methods of genotoxicity assessment.
4. **Evaluate the role of nutrition and food safety in public health**
   Understand the ecological aspects of nutrition, assess food quality and safety, recognize food fraud, and apply basic principles of risk assessment.
5. **Examine the impact of pollutants on physiological systems**
   Describe how environmental pollutants affect human biological systems, particularly the immune system, and assess risks related to long-term exposure.
6. **Apply environmental health principles to quality of life and public health programs**
   Identify and evaluate health protection measures and programs, and analyse environmental determinants that influence quality of life in living and working environments.

Upon successful completion of the seminar component, students will be able to:

1. **Evaluate environmental media and their impact on health**
   Describe the characteristics of air and water in natural and polluted conditions, explain major environmental processes such as the hydrological cycle, and assess their importance for human health.
2. **Assess water quality and wastewater management**
   Identify sources and types of water pollution, interpret physical, chemical, and biological indicators of water quality, and explain the principles and stages of wastewater treatment and drainage systems.
3. **Analyse waste management and associated health risks**
   Define different types of waste, particularly medical waste, and evaluate the health risks related to improper handling, as well as methods for safe disposal.
4. **Evaluate food composition, safety, and everyday exposure risks**
   Identify food components and methods for their analysis, recognize harmful substances in food and items of general use, and explain mechanisms for their monitoring and control.
5. **Explain the relationship between nutrition and health**
   Describe the role of nutrients in growth and development, and assess the health consequences of inadequate, excessive, or unbalanced nutrition.

List of assigned reading:

1. M. Kaštelan Macan, M. Petrović: Kemija okoliša, HINUS i FKIT, 2013

2. Valić F. Zdravstvena ekologija, Medicinski fakultet Sveučilišta u Zagrebu, Zagreb,2001

3. Handbook for students: attached in Merlin

List of optional reading:

Adidtional literature:

1. C. Baird: Environmental Chemistry, 2 Ed., W.F. Friedman &Comp, 2003

2. R. Beaglehole, R. Bonita, T. Kjellstrom: Basic Epidemiology, WHO Geneva, 1993

3. Lecture notes

Method of examination.:

Final exam is oral egsam with one of the lecture teachers or course leader.

Curriculum:

Lectures list (with titles and explanation):

L1, L2. Introduction, Ecology, ecosystems: structure and function

Students will be introduced to the content of the course, literature, and the method of assessment. To define the structure and function of ecosystems and explain the role of elements in the biochemical cycle.

The lectures will be given by the course leader Dijana Tomić Linšak, PhD, Associate Professor

L3, L4 Human impact on ecosystem. Environmental factors and their effects on the environment and man

To define the factors that affect the mode of spread and the lifespan of pollutants in the environment and state the causes of environmental pollution. Human impact on the environment and vidsible consequences trought the time. To list the most common groups of chemical compounds - pollutants (metals, chlorinated hydrocarbons, polycyclic aromatic hydrocarbons) and explain their effects on the environmen and man.

The lectures will be given by the course leader Dijana Tomić Linšak, PhD, Associate Professor

L5, L6 Chemical genotoxic agents - Impact of urbanization on increased environmental pollution

This lecture provides a structured approach to understanding the complex relationship between chemical genotoxic agents and urbanization-driven environmental pollution.

The lectures will be given by the Associate professor Aleksandar Bulog, PhD

L7, L8 Climate change and the consequences caused by the emergence of infectious diseases.

This lecture provides a detailed framework for understanding the complex relationship between climate change and the emergence of infectious diseases.

The lectures will be given by the course leader Associate Professor Dijana Tomić Linšak, PhD

L9, L10 Ecological genetics - Environmental diseases

To explain the effect of pollutants on genetic material and to describe the methods of genotoxicity testing material.

The lectures will be given by the Associate Professor Aleksandar Bulog, PhD

L11, L12. Health - ecological aspects of nutrition

To explain eating habits and the importance of nutrition for human health, to understand the problems of proper modern nutrition, to understand the nutritional profile of food and the physiologically functional ingredients of food.

The lectures will be given by the Assistant Professor Gordana Kenđel Jovanović, PhD

L13, L14 Food frauds and Risk assessment

To define food fraud and its various forms (e.g., adulteration, mislabelling...). Identify the common types of food fraud and their impact on public health, economy, and brand reputation. Explain the principles of risk assessment in the context of food safety.

The lectures will be given by the Associate Professor Dražen Lušić , PhD

L15, L16 Ecotoxicological influence of pollutants on the human immune system

To clarify the impact of global anthropogenic sources of pollution and the impact of major environmental pollutants on changes in the functioning of certain aspects of the immune system in humans.

The lectures will be given by the Associate Professor Aleksandar Bulog, PhD

L17, L18 Health care programs

To identify programs of measures in the field of health care.

The lectures will be given by the Associate Professor Iva Sorta Bilajac Turina, MD, PhD

L19, L20 Quality of life in the environment

To define and identify those aspects of research of environmental factors that directly affect the maintenance of the quality of life in the immediate work and/or ambient environment.

The lectures will be given by the Associate Professor Iva Sorta Bilajac Turina, MD, PhD

Seminars list (with titles and explanation):

S1, S2 Air

To list the chemical characteristics of clean and polluted atmosphere, local and global air pollution problems and to explain the impact of air pollution on the environment and human health.

The seminar will be given by the course leader Dijana Tomić Linšak, Assosciate Professor, PhD

S3, S4 Waters in nature

To explain the concept of water circulation in nature, phases of the hydrological cycle, distribution of water on earth. To define the types of water used as sources of drinking water, their origin, basic characteristics and methods of use.

The seminar will be given by the Assosciate Professor Dražen Lušić, PhD

S5, S6 Wastewaters

To list the types and sources of water pollution in nature and water for human consumption. To define types of wastewater (municipal, industrial, precipitation, cooling), and wastewater quality indicators (physical, chemical, biological). To describe the methods of wastewater treatment (stages of treatment - levels of treatment) and introduction to the drainage system.

The seminar will be given by the Assosciate Professor Dražen Lušić, PhD

S7, S8 Waste

To define the generation and distribution of medical waste, to explain the risks to health due to improper management of the same, and the ways of its proper disposal.

The seminar will be given by the Assosciate Professor Luka Traven, PhD

S9, S10 Food and food safety

To list the individual ingredients of foods and to list the chemical methods for their determination.

The seminar will be given by the Assistant Professor Gordana Kenđel Jovanović, PhD

S11-S13 Articles of general use

To list the harmful substances that can be found in items of general use and explain how they are being controlled.

The seminar will be given by the Assistant Professor Gordana Kenđel Jovanović, PhD

S14, S15 Nutrition and health

To list the types of foods and food ingredients and to explain their impact on the growth, development and maintenance of organisms as well as the diseases which can occur due to improper, insufficient or excessive intake of certain nutrients.

The seminar will be given by the Assistant Professor Gordana Kenđel Jovanović, PhD

Practicals list (with titles and explanation):

E1, E2 Air quality control methods

During the exercises, students will be presented with the performance of analytical procedures for determining the parameters that are the basis for the assessment of the safety of drinking water, the level of organic and inorganic pollutants in water, determination of the parameters on the basis of which the microbiological and chemical safety of food and general use items are assessed as well as the physicochemical methods of air pollution monitoring, method of

their collection, processing, and presentation to the public.

The exercises will be given by the course leader Dijana Tomić Linšak, Assosiate Professor, PhD

E3, E4 Drinking water control

During the exercises, students will be presented with the performance of analytical procedures for determining the parameters that are the basis for the assessment of the safety of drinking water, the level of organic and inorganic pollutants in water, determination of the parameters on the basis of which the microbiological and chemical safety of food and general use items are assessed as well as the physicochemical methods of air pollution monitoring, method of their collection, processing, and presentation to the public.

The exercises will be given by the Associate Professor, Dražen Lušić, PhD

E5-E7 Wastewater control

During the exercises, students will be presented with the performance of analytical procedures for determining the parameters that are the basis for the assessment of the safety of drinking water, the level of organic and inorganic pollutants in water, determination of the parameters on the basis of which the microbiological and chemical safety of food and general use items are assessed as well as the physicochemical methods of air pollution monitoring, method of their collection, processing, and presentation to the public.

The exercises will be given by the Associate Professor, Dražen Lušić, PhD

E8-E10 Microbiological control of food and the environment

During the exercises, students will be presented with the performance of analytical procedures for determining the parameters that are the basis for the assessment of the safety of drinking water, the level of organic and inorganic pollutants in water, determination of the parameters on the basis of which the microbiological and chemical safety of food and general use items are assessed as well as the physicochemical methods of air pollution monitoring, method of their collection, processing, and presentation to the public.

The exercises will be given by the Associate Professor, Dražen Lušić, PhD

E11-E13 Control of foodstuffs and articles of general use

During the exercises, students will be presented with the performance of analytical procedures for determining the parameters that are the basis for the assessment of the safety of drinking water, the level of organic and inorganic pollutants in water, determination of the parameters on the basis of which the microbiological and chemical safety of food and general use items are assessed as well as the physicochemical methods of air pollution monitoring, method of their collection, processing, and presentation to the public.

The exercises will be given by Sanja Klarić, M.sc

E14, E15 An overview of analytical techniques used in environmental analysis

During the exercises, students will be presented with the performance of analytical procedures for determining the parameters that are the basis for the assessment of the safety of drinking water, the level of organic and inorganic pollutants in water, determination of the parameters on the basis of which the microbiological and chemical safety of food and general use items are assessed as well as the physicochemical methods of air pollution monitoring, method of their collection, processing, and presentation to the public.

The exercises will be given by the Assistant Professor, Igor Dubrović, PhD

Student obligations:

Students are required to attend regularly and to actively participate in all forms of classes. A student that has not fulfilled his / her obligations prescribed by the study program if he/she has missed more than 30% of teaching hours of all forms of teaching (lectures, seminars, exercises) according to the Ordinance on student assessment at the Medical Faculty in Rijeka. According to the recommendation of the University, the student can reject a positive grade on the exam, but must sign a specific form accepting an insufficient grade with one of the three possible exams used. The colloquium can also be repeated but the date of the corrective colloquium will be after the first exam period.

Exam (exam taking, description of the written/oral/practical part of the exam, point distribution, grading criteria):

ECTS credit grading system:

Student assessment is carried out according to the current Rulebook on Studies at the University of Rijeka and according to the Ordinance on student assessment at the Medical Faculty in Rijeka (adopted by the Faculty Council of the Medical Faculty in Rijeka on June 12, 2018).

Student work is evaluated and graded during classes and at the final exam. Out of a total of 100 points, during the classes, the student can achieve 50 points and 50 points in the final exam.

Student assessment is performed using ECTS (A-F) and the number system (1-5). Assessment in the ECTS system is performed according to the assessment criteria from the Decision on Amendments to the Rulebook on Studies of the University of Rijeka, Article 29.

Of the maximum 50 grade points that can be achieved during the course, the student must collect a minimum of 50% and more grade points out of the grade points that could be obtained during the course, as well as through forms of continuous monitoring and evaluation of students. In accordance with the rules and/or study program, this student can access the final exam. The Student who achieved from 0 to 49.9% of grades during classes, out of the grades that could be obtained during classes through forms of continuous monitoring and evaluation of students, in accordance with the rules and or study program, is graded F (unsuccessful), cannot acquire ECTS credits, and must re-enroll in the course.

A student may miss 30% of classes due to health reasons, which is justified by a medical certificate. Attendance at lectures is mandatory. If a student justifiably or unjustifiably misses more than 30% of classes, he/she cannot continue following the course and lose the opportunity to take the final exam.

I. During classes, the following are evaluated (maximum up to 50 points):

a) Obligatory written colloquium (up to 50 points) - the threshold of passing the colloquium is 50%, and points for the solved test below the threshold are not given. The written colloquium consists of 26 questions and is written after the first week of classes. Table 1 shows the conversion of correct answers on the colloquium into points.

Table 1. Converting the correct answers on the colloquium into points

Number of correct answers on the Colloquium	Points
13	25
14	27
15	29
16	31
17	33
18	35
19	37
20	39

21	41
22	43
23	45
24	47
25	49
26	50

Final exam (up to 50 grades)

The final exam is oral and is scored with a maximum of 50 points. The exam threshold at the final exam cannot be less than 50% of the successfully passed exam.

Evaluation	Points
Sufficient (2)	25-31
Good (3)	32-38
Very good (4)	39-45
Excellent (5)	46-50

The final grade is formed in such a way that the points achieved in the final exam are added to the grade points achieved during the classes. Student assessment based on final achievement is performed as follows:

Criterion	Numerical grade	ECTS grade
90 - 100%	5 (excellent)	A
75 - 89,9%	4 (very good)	B
60 – 74,9%	3 (good)	C
50 - 59,9%	2 (sufficient)	D
0 - 49,9%	1 (insufficient)	F

Other notes (related to the course) important for students:

As Lectures, seminars and exercises in Health Ecology take place in one group, please be avare that larger group of students in the laboratory is not permited, so sometime students will be expected to take smaller groups while visiting laboratory.

COURSE HOURS 2025/2026

Health Ecology

Lectures (Place and time or group)	**Practicals** (Place and time or group)	**Seminars** (Place and time or group)
25.05.2026		

L1, L2. Introduction, Ecology, ecosystems: structure and function:
• P17 NZZJZ (08:00 - 10:00) [1310]
  ○ HE_403
	E1, E2 Air quality control methods:
	• P17 NZZJZ (12:00 - 14:00) [1310]
	  ○ HE_403
		S1, S2 Air:
		• P17 NZZJZ (10:00 - 12:00) [1310]
		  ○ HE_403

izv. prof. dr. sc. Tomić Linšak Dijana, dipl. sanit. ing. [1310]		
26.05.2026		

L3, L4 Human impact on ecosystem. Environmental factors and their effects on the environment and man:
• P17 NZZJZ (10:00 - 12:00) [1310]
  ○ HE_403
		S7, S8 Waste:
		• P17 NZZJZ (08:00 - 10:00) [415]
		  ○ HE_403

izv. prof. dr. sc. Tomić Linšak Dijana, dipl. sanit. ing. [1310] · prof. Traven Luka, dipl. ing. [415]		
27.05.2026		

L5, L6 Chemical genotoxic agents - Impact of urbanization on increased environmental pollution:
• P17 NZZJZ (08:00 - 10:00) [412]
  ○ HE_403
 	
L7, L8 Climate change and the consequences caused by the emergence of infectious diseases.:
• P17 NZZJZ (10:00 - 12:00) [1310]
  ○ HE_403		

izv. prof. dr. sc. Bulog Aleksandar, mag. sanit. ing. [412] · izv. prof. dr. sc. Tomić Linšak Dijana, dipl. sanit. ing. [1310]		
28.05.2026		

L9, L10 Ecological genetics - Environmental diseases:
• P17 NZZJZ (08:00 - 10:00) [412]
  ○ HE_403
	E3, E4 Drinking water control:
	• P17 NZZJZ (12:00 - 14:00) [1323]
	  ○ HE_403
		S3, S4 Waters in nature:
		• P17 NZZJZ (10:00 - 12:00) [1323]
		  ○ HE_403

izv. prof. dr. sc. Bulog Aleksandar, mag. sanit. ing. [412] · prof. dr. sc. Lušić Dražen, dipl. sanit. ing. [1323]		
29.05.2026		

	E5-E7 Wastewater control:
	• P17 NZZJZ (10:00 - 13:00) [1323]
	  ○ HE_403
		S5, S6 Wastewaters:
		• P17 NZZJZ (08:00 - 10:00) [1323]
		  ○ HE_403

prof. dr. sc. Lušić Dražen, dipl. sanit. ing. [1323]		
01.06.2026		

L11, L12. Health - ecological aspects of nutrition:
• P17 NZZJZ (08:00 - 10:00) [1745]
  ○ HE_403
	E8-E10 Microbiological control of food and the environment:
	• P17 NZZJZ (12:00 - 15:00) [1323]
	  ○ HE_403
		S9, S10 Food and food safety:
		• P17 NZZJZ (10:00 - 12:00) [1745]
		  ○ HE_403

doc. dr.sc. Kenđel Jovanović Gordana, dipl. ing. preh. bioteh. [1745] · prof. dr. sc. Lušić Dražen, dipl. sanit. ing. [1323]		
02.06.2026		
L13, L14 Food frauds and Risk assessment: • P17 NZZJZ (08:00 - 10:00) [1323] ◦ HE_403 L15, L16 Ecotoxicological influence of pollutants on the human immune system: • P17 NZZJZ (10:00 - 12:00) [412] ◦ HE_403		S11-S13 Articles of general use: • P17 NZZJZ (12:00 - 15:00) [1745] ◦ HE_403
izv. prof. dr. sc. Bulog Aleksandar, mag. sanit. ing. [412] · doc. dr.sc. Kenđel Jovanović Gordana, dipl. ing. preh. bioteh. [1745] · prof. dr. sc. Lušić Dražen, dipl. sanit. ing. [1323]		
03.06.2026		
	E11-E13 Control of foodstuffs and articles of general use: • P17 NZZJZ (08:00 - 11:00) [416] ◦ HE_403 E14, E15 An overview of analytical techniques used in environmental analysis: • P17 NZZJZ (11:00 - 13:00) [417] ◦ HE_403	S14, S15 Nutrition and health: • P17 NZZJZ (13:00 - 15:00) [1745] ◦ HE_403
nasl. doc. dr. sc. Dubrović Igor, dipl. sanit. ing. [417] · doc. dr.sc. Kenđel Jovanović Gordana, dipl. ing. preh. bioteh. [1745] · nasl. asistentica, mr.sc. Klarić Sanja, dipl. sanit. ing. [416]		
05.06.2026		
L17, L18 Health care programs: • ONLINE (09:00 - 11:00) [1765] ◦ HE_403 L19, L20 Quality of life in the environment: • ONLINE (11:00 - 13:00) [1765] ◦ HE_403		
nasl. prof. dr. sc. Sorta-Bilajac Turina Iva, dr. med. [1765]		

List of lectures, seminars and practicals:

LECTURES (TOPIC)	Number of hours	Location
L1, L2. Introduction, Ecology, ecosystems: structure and function	2	P17 NZZJZ
L3, L4 Human impact on ecosystem. Environmental factors and their effects on the environment and man	2	P17 NZZJZ
L5, L6 Chemical genotoxic agents - Impact of urbanization on increased environmental pollution	2	P17 NZZJZ
L7, L8 Climate change and the consequences caused by the emergence of infectious diseases.	2	P17 NZZJZ
L9, L10 Ecological genetics - Environmental diseases	2	P17 NZZJZ
L11, L12. Health - ecological aspects of nutrition	2	P17 NZZJZ
L13, L14 Food frauds and Risk assessment	2	P17 NZZJZ
L15, L16 Ecotoxicological influence of pollutants on the human immune system	2	P17 NZZJZ

L17, L18 Health care programs	2	ONLINE
L19, L20 Quality of life in the environment	2	ONLINE

PRACTICALS (TOPIC)	Number of hours	Location
E1, E2 Air quality control methods	2	P17 NZZJZ
E3, E4 Drinking water control	2	P17 NZZJZ
E5-E7 Wastewater control	3	P17 NZZJZ
E8-E10 Microbiological control of food and the environment	3	P17 NZZJZ
E11-E13 Control of foodstuffs and articles of general use	3	P17 NZZJZ
E14, E15 An overview of analytical techniques used in environmental analysis	2	P17 NZZJZ

SEMINARS (TOPIC)	Number of hours	Location
S1, S2 Air	2	P17 NZZJZ
S3, S4 Waters in nature	2	P17 NZZJZ
S5, S6 Wastewaters	2	P17 NZZJZ
S7, S8 Waste	2	P17 NZZJZ
S9, S10 Food and food safety	2	P17 NZZJZ
S11-S13 Articles of general use	3	P17 NZZJZ
S14, S15 Nutrition and health	2	P17 NZZJZ

EXAM DATES (final exam):

1.	15.06.2026.
2.	03.07.2026.
3.	03.09.2026.
4.	17.09.2026.