[Medicinski fakultet u Rijeci]

**Curriculum**
**2024/2025**

[Za kolegij]

# Health Ecology

| | |
|---|---|
| Study program: | **Medical Studies in English (R)**<br>[Sveučilišni integrirani prijediplomski i diplomski studij] |
| Department: | **[Katedra za zdravstvenu ekologiju]** |
| 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 Health Ecology is a compulsory course in the 5th year of the Integrated Undergraduate and Graduate University Study of Medicine. The course consists of 20 hours of lectures, 15 hours of seminars, and 15 hours of exercises, a total of 50 hours of teaching (2.5 ECTS). It is held at the Faculty of Medicine and in lecture halls and laboratories in the main facility of the Institute of Public Health of Primorsko-Goranska County, Krešimirova 52a.

Course objective

Students will acquire knowledge to understand the relationship between health and disease in relation to the negative effects of environmental factors.

Teaching

Classes are held in shifts, daily for two weeks. Every day there are 20 hours of lectures and 15 hours of seminars and 15 hours of exercises.

## 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

## [Način polaganja ispita]:

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

## Curriculum:

### [Predavanja] 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

**[Seminari] 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

**[Vježbe] 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 up to 5 % points, and 95% points in the final exam. A student may miss 30% of classes due to health reasons, which is justified by a medical certificate.  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 5 grade points that can be achieved during the course by regural class attendance, a student can earn a maximum of 95 grade points on the final exam, . 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 loses the opportunity to take the final exam. In accordance with the rules and/or study program this student can access the final exam.

I. During classes, the following are evaluated (maximum up to 5 grade points):

Table 1. Converting regural class attendance into grade points

| | |
|---|---|
| 0-16 hours | 0 points |
| 17-28 hours | 2,5 points |
| 29-35 hours | 5 points |

Final exam (up to 95 grade points)

The final exam is oral and is scored with a maximum of 95 points. The exam threshold at the final exam cannot be less than 50% of the successfully passed exam.

| **Evaluation of the final exam** | | |
|---|---|---|
| Scoring correct answers on the final exam | Points | Grade |
| Correct answer to 90-100% of the questions asked | 85,5-95 | Exellent (5) |
| Correct answer to 75-89.9% of the questions asked | 71,5-85 | Very good (4) |
| Correct answer to 60-74.9% of the questions asked | 57-71 | Good (3) |
| Correct answer to 50-59.9% of the questions asked | 48-56,5 | Sufficient |

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:

| **Final grade** | | |
|---|---|---|
| Crietrion | Numerical grade | ECTS grade |
| A (90-100%) | Excellent (5) | A |
| B (75-89,9%) | Very good (4) | B |
| C (60-74,9%) | Good (3) | C |

| | | |
|---|---|---|
| D (50-59,9%) | Sufficient (2) | D |
| F (0-49,9%) | Insufficient (1) | 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 2024/2025

Health Ecology

| **[Predavanja]**<br>(Place and time or group) | **[Vježbe]**<br>(Place and time or group) | **[Seminari]**<br>(Place and time or group) |
|---|---|---|
| **26.05.2025** | | |
| L1, L2. Introduction, Ecology, ecosystems: structure and function:<br>• [P20 NZZJZ - Akvarij] (08:00 - 10:00) [1310]<br>  ○ HE_403 | E1, E2 Air quality control methods:<br>• [P21 NZZJZ, Lab. III kat] (12:00 - 14:00) [1310]<br>  ○ HE_403 | S1, S2 Air:<br>• [/] (10:00 - 12:00) [1310]<br>  ○ HE_403 |
| izv. prof. dr. sc. Tomić Linšak Dijana, dipl. sanit. ing. [1310] | | |
| **27.05.2025** | | |
| L3, L4 Human impact on ecosystem. Environmental factors and their effects on the environment and man:<br>• [/] (08:00 - 10:00) [1310]<br>  ○ HE_403<br><br>L5, L6 Chemical genotoxic agents - Impact of urbanization on increased environmental pollution:<br>• [/] (12:00 - 14:00) [412]<br>  ○ HE_403 | | S7, S8 Waste:<br>• [/] (10:00 - 12:00) [415]<br>  ○ HE_403 |
| izv. prof. dr. sc. Bulog Aleksandar, mag. sanit. ing. [412] · izv. prof. dr. sc. Tomić Linšak Dijana, dipl. sanit. ing. [1310] · prof. Traven Luka, dipl. ing. [415] | | |
| **28.05.2025** | | |
| L7, L8 Climate change and the consequences caused by the emergence of infectious diseases.:<br>• [/] (08:00 - 10:00) [1310]<br>  ○ HE_403 | E3, E4 Drinking water control:<br>• [P21 NZZJZ, Lab. III kat] (12:00 - 14:00) [1323]<br>  ○ HE_403 | S3, S4 Waters in nature:<br>• [/] (10:00 - 12:00) [1323]<br>  ○ HE_403 |
| izv. prof. dr. sc. Lušić Dražen, dipl. sanit. ing. [1323] · izv. prof. dr. sc. Tomić Linšak Dijana, dipl. sanit. ing. [1310] | | |
| **29.05.2025** | | |
| L9, L10 Ecological genetics - Environmental diseases:<br>• [/] (08:00 - 10:00) [412]<br>  ○ HE_403 | E5-E7 Wastewater control:<br>• [P21 NZZJZ, Lab. III kat] (12:00 - 15:00) [1323]<br>  ○ HE_403 | S5, S6 Wastewaters:<br>• [/] (10:00 - 12:00) [1323]<br>  ○ HE_403 |
| izv. prof. dr. sc. Bulog Aleksandar, mag. sanit. ing. [412] · izv. prof. dr. sc. Lušić Dražen, dipl. sanit. ing. [1323] | | |
| **02.06.2025** | | |
| L11, L12. Health - ecological aspects of nutrition:<br>• [/] (08:00 - 10:00) [1745]<br>  ○ HE_403 | E8-E10 Microbiological control of food and the environment:<br>• [P21 NZZJZ, Lab. III kat] (12:00 - 15:00) [1323]<br>  ○ HE_403 | S9, S10 Food and food safety:<br>• [/] (10:00 - 12:00) [1745]<br>  ○ HE_403 |
| doc. dr.sc. Kenđel Jovanović Gordana, dipl. ing. preh. bioteh. [1745] · izv. prof. dr. sc. Lušić Dražen, dipl. sanit. ing. [1323] | | |
| **03.06.2025** | | |

| | | |
|---|---|---|
| L13, L14 Food frauds and Risk assessment:<br>• [/] (08:00 - 10:00) [1323]<br>◦ HE_403 | | S11-S13 Articles of general use:<br>• [/] (10:00 - 13:00) [1745]<br>◦ HE_403 |
| doc. dr.sc. Kenđel Jovanović Gordana, dipl. ing. preh. bioteh. [1745] · izv. prof. dr. sc. Lušić Dražen, dipl. sanit. ing. [1323] | | |
| **04.06.2025** | | |
| L15, L16 Ecotoxicological influence of pollutants on the human immune system:<br>• [/] (08:00 - 10:00) [412]<br>◦ HE_403 | E11-E13 Control of foodstuffs and articles of general use:<br>• [/] (12:00 - 15:00) [416]<br>◦ HE_403 | S14, S15 Nutrition and health:<br>• [/] (10:00 - 12:00) [1745]<br>◦ HE_403 |
| izv. prof. dr. sc. Bulog Aleksandar, mag. sanit. ing. [412] · doc. dr.sc. Kenđel Jovanović Gordana, dipl. ing. preh. bioteh. [1745] · nasl. asistentica, mr.sc. Klarić Sanja, dipl. sanit. ing. [416] | | |
| **05.06.2025** | | |
| L17, L18 Health care programs:<br>• [/] (08:00 - 10:00) [1765]<br>◦ HE_403 | E14, E15 An overview of analytical techniques used in environmental analysis:<br>• [/] (10:00 - 12:00) [417]<br>◦ HE_403 | |
| nasl. doc. dr. sc. Dubrović Igor, dipl. sanit. ing. [417] · nasl. prof. dr. sc. Sorta-Bilajac Turina Iva, dr. med. [1765] | | |
| **06.06.2025** | | |
| L19, L20 Quality of life in the environment:<br>• [/] (08:00 - 10:00) [1765]<br>◦ HE_403 | | |
| nasl. prof. dr. sc. Sorta-Bilajac Turina Iva, dr. med. [1765] | | |

### List of lectures, seminars and practicals:

| [PREDAVANJA] (TOPIC) | Number of hours | Location |
|---|---|---|
| L1, L2. Introduction, Ecology, ecosystems: structure and function | 2 | [P20 NZZJZ - Akvarij] |
| L3, L4 Human impact on ecosystem. Environmental factors and their effects on the environment and man | 2 | [/] |
| L5, L6 Chemical genotoxic agents - Impact of urbanization on increased environmental pollution | 2 | [/] |
| L7, L8 Climate change and the consequences caused by the emergence of infectious diseases. | 2 | [/] |
| L9, L10 Ecological genetics - Environmental diseases | 2 | [/] |
| L11, L12. Health - ecological aspects of nutrition | 2 | [/] |
| L13, L14 Food frauds and Risk assessment | 2 | [/] |
| L15, L16 Ecotoxicological influence of pollutants on the human immune system | 2 | [/] |
| L17, L18 Health care programs | 2 | [/] |
| L19, L20 Quality of life in the environment | 2 | [/] |

| [VJEŽBE] (TOPIC) | Number of hours | Location |
|---|---|---|

| | | |
|---|---|---|
| E1, E2 Air quality control methods | 2 | [P21 NZZJZ, Lab. III kat] |
| E3, E4 Drinking water control | 2 | [P21 NZZJZ, Lab. III kat] |
| E5-E7 Wastewater control | 3 | [P21 NZZJZ, Lab. III kat] |
| E8-E10 Microbiological control of food and the environment | 3 | [P21 NZZJZ, Lab. III kat] |
| E11-E13 Control of foodstuffs and articles of general use | 3 | [/] |
| E14, E15 An overview of analytical techniques used in environmental analysis | 2 | [/] |

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

### EXAM DATES (final exam):

| | |
|---|---|
| 1. | 16.06.2025. |
| 2. | 07.07.2025. |
| 3. | 04.09.2025. |
| 4. | 18.09.2025. |