

## **Doctoral School of Environmental Sciences**

The regulations are effective from 1 September, 2022

**Discipline:** Science

**Form of education:** Doctor of Philosophy (Ph.D.) training

**Program objectives:** to acquire the academic degree training, acquisition of practice in higher education

**Training time:** 4 + 4 semesters

**Training type:** regular school

**Financing:** state-sponsored or tuition fee based

**Entrance requirements:** Master's degree and a successful entrance exam

**Language requirements:** at least level B2 complex state-recognised language certificate in English or equivalent certified language proficiency in English is required and at least basic knowledge of a second language

**The training ends with:** Absolutorium (Thesis)

**The number of credits required:** 240

**Ways of getting credits / modules:** training credits (48), research credits (180) + other (see Regulations of The Doctoral School)

**Responsible for the training:** Prof. Tamás Turányi, head of the Doctoral school

Name of faculty responsible for training: Faculty of Science

Doctoral education programs: Environmental Biology, Environmental Physics, Environmental Chemistry, Environmental Earth Sciences

### **Program director:**

Environmental Biology (KÖR-2/1):	Dr. Erika Tóth
Environmental Physics (KÖR-2/2):	Dr. Ákos Horváth
Environmental Chemistry (KÖR-2/3):	Dr. Tamás Turányi
Environmental Earth Sciences (KÖR-2/4):	Dr. Zoltán Szalai

### **Training / Learning Module:**

KÖR-2/02 Meteorological modeling of the land-surface–atmosphere interactions: a historical review Ács Ferenc

6 credits, theory, optional, no repetition

KÖR-2/03 Application of isotopes in environmental science Czuppon György

6 credits, theory, optional, no repetition

KÖR-2/04 Environmental climatology Bartholy Judit

6 credits, theory, optional, no repetition

KÖR-2/05 Microbial ecology of waters and aquatic habitats Kériné Borsodi Andrea and Tóth Erika

6 credits, theory, optional, no repetition

KÖR-2/06 Environmental aspects of subsurface carbon dioxide storage Falus György

6 credits, theory, optional, no repetition

KÖR-2/07 The application of infrared spectrometry to Earth Sciences Kovács István János

6 credits, theory, optional, no repetition

KÖR-2/08 Writing scientific papers in English Böddi Béla

6 credits, theory, optional, no repetition

KÖR-2/09 Ecology of soil seed banks Csontos Péter  
6 credits, theory, optional, no repetition

KÖR-2/10 Spatial and temporal analysis of environmental geochemical data Jordán Győző  
6 credits, theory, optional, no repetition

KÖR-2/11 Volcanic heritage and geotourism Harangi Szabolcs  
6 credits, theory, optional, no repetition

KÖR-2/12 Transboundary environmental impacts and international environmental cooperation  
Faragó Tibor  
6 credits, theory, optional, no repetition

KÖR-2/13 Environmental biophysics Horváth Gábor  
6 credits, theory, optional, no repetition

KÖR-2/15 General and special aspects of plant mineral nutrition and the nutrient stress Fodor  
Ferenc  
6 credits, theory, optional, no repetition

KÖR-2/16 Micrometeorology Weidinger Tamás  
6 credits, theory, optional, no repetition

KÖR-2/17 Sensory biophysics I.: Polarization sensitivity and its environmental optical aspects  
Horváth Gábor  
6 credits, theory, optional, no repetition

KÖR-2/18 Community ecology of tropics Hufnagel Levente  
6 credits, theory, optional, no repetition

KÖR-2/19 Weather and climate models Breuer Hajnalka  
6 credits, theory, optional, no repetition

KÖR-2/20 Nuclear environmental protection Homonnay Zoltán  
6 credits, theory, optional, no repetition

KÖR-2/21 Radon in natural and artificial environments Horváth Ákos  
6 credits, theory, optional, no repetition

KÖR-2/22 Bio-geochemical models Grosz Balázs Péter  
6 credits, theory, optional, no repetition

KÖR-2/23 Soil organic matter research Szalai Zoltán  
6 credits, theory, optional, no repetition

KÖR-2/25 Environmental sociology Izsák Éva  
6 credits, theory, optional, no repetition

KÖR-2/26 Physics of environmental flows Jánosi Imre  
6 credits, theory, optional, no repetition

KÖR-2/28 Grasslands ecology Kalapos Tibor  
6 credits, theory, optional, no repetition

KÖR-2/34 Hydrobiology Török Júlia  
6 credits, theory, optional, no repetition

KÖR-2/36 Geostatistical analysis in environmental science Kovács József and Hatvani István  
Gábor  
6 credits, theory, optional, no repetition

KÖR-2/39 Hydrogeology of karst systems Mádlné Szőnyi Judit  
6 credits, theory, optional, no repetition

KÖR-2/40 Basic microbiological processes for environmental protection Márialigeti Károly  
6 credits, theory, optional, no repetition

KÖR-2/42 Modelling of deposition of trace gases Mészáros Róbert  
6 credits, theory, optional, no repetition

KÖR-2/45 Atmospheric aerosols and environmental impacts Salma Imre  
6 credits, theory, optional, no repetition

KÖR-2/47 Sustainable energy management Munkácsy Béla

6 credits, theory, optional, no repetition  
 KÖR-2/52 Cycling of elements Szabó Csaba  
 6 credits, theory, optional, no repetition  
 KÖR-2/55 How to measure size and shape of nano- and micro size particles? Szalai Zoltán  
 6 credits, theory, optional, no repetition  
 KÖR-2/56 Pedogenesis Szalai Zoltán  
 6 credits, theory, optional, no repetition  
 KÖR-2/57 Introduction to digital surface modelling Székely Balázs  
 6 credits, theory, optional, no repetition  
 KÖR-2/61 Scale dependent atmospheric dispersion models Weidinger Tamás  
 6 credits, theory, optional, no repetition  
 KÖR-2/63 Environmental analysis Záray Gyula  
 6 credits, theory, optional, no repetition  
 KÖR-2/65 Thermal waters and geothermal energy Mádlné Szőnyi Judit  
 6 credits, theory, optional, no repetition  
 KÖR-2/66 Introduction to Prokaryotic taxonomy Tóth Erika and Vajna Balázs  
 6 credits, theory, optional, no repetition  
 KÖR-2/72 Groundwater flow systems in sedimentary basins Mádlné Szőnyi Judit  
 6 credits, theory, optional, no repetition  
 KÖR-2/73 Generation of air pollution in combustion systems Turányi Tamás  
 6 credits, theory, optional, no repetition  
 KÖR-2/75 Hyphenated techniques for element speciation Mihucz Viktor  
 6 credits, theory, optional, no repetition  
 KÖR-2/76 Advanced Separation Science Eke Zsuzsanna  
 6 credits, theory, optional, no repetition  
 KÖR-2/77 Methods of multivariate data analysis 1. Héberger Károly  
 6 credits, theory, optional, no repetition  
 KÖR-2/78 The global carbon cycle Barcza Zoltán  
 6 credits, theory, optional, no repetition  
 KÖR-2/82 Radiobiology and environmental radiohygiene Turai István  
 6 credits, theory, optional, no repetition  
 KÖR-2/83 Soil microbiology Borsodi Andrea and Szili Kovács Tibor  
 6 credits, theory, optional, no repetition  
 KÖR-2/84 Environmental health Vargha Márta  
 6 credits, theory, optional, no repetition  
 KÖR-2/89 International conventions on environmental protection and nature conservation  
 Faragó Tibor  
 6 credits, theory, optional, no repetition  
 KÖR-2/90 Soil protection measurements on the field Jakab Gergely / Farsang Andrea  
 (SZTE) / Barta Károly (SZTE) / Centeri Csaba (SZIE)  
 6 credits, theory, optional, no repetition  
 KÖR-2/91 Environmental science and policy related international cooperation: its  
 development, organisations, fora, programmes and agreements Faragó Tibor  
 6 credits, theory, optional, no repetition  
 KÖR-2/93 Atmospheric icing of structures Kollár László  
 6 credits, theory, optional, no repetition  
 KÖR-2/94 Human biology and environmental science Tóth Gábor Antal  
 6 credits, theory, optional, no repetition  
 KÖR-2/95 Introduction to light pollution studies Kolláth Zoltán  
 6 credits, theory, optional, no repetition  
 KÖR-2/96 Radiation transfer in Earth's atmosphere Kolláth Zoltán  
 6 credits, theory, optional, no repetition

KÖR-2/100 Survival kit for scientific life Torma Csaba Zsolt  
6 credits, theory, optional, no repetition

KÖR-2/101 New approaches to urban studies Berki Márton  
6 credits, theory, optional, no repetition

KÖR-2/102 Methods of applied statistics Keszei Ernő  
6 credits, theory, optional, no repetition

KÖR-2/103 Modern reaction kinetics Keszei Ernő  
6 credits, theory, optional, no repetition

KÖR-2/104 Introduction to Separation Sciences Zsigrainé Vasánits Anikó  
6 credits, theory, optional, no repetition

KÖR-2/105 Basics of reaction kinetics Túri László  
6 credits, theory, optional, no repetition

KÖR-2/106 Chemometrics Tóth Gergely  
6 credits, theory, optional, no repetition

KÖR-2/107 Theory of NMR techniques Rohonczy János  
6 credits, theory, optional, no repetition

KÖR-2/108 NMR spectroscopy of solids and solutions Rohonczy János  
6 credits, theory, optional, no repetition

KÖR-2/109 Methods of multivariate data analysis 2. Héberger Károly  
6 credits, theory, optional, no repetition

KÖR-2/110 Karst hydrogeology Kovács Attila  
6 credits, theory, optional, no repetition

KÖR-2/113 European regional climate modelling practices: EURO-CORDEX and Med-CORDEX Torma Csaba Zsolt  
6 credits, theory, optional, no repetition

KÖR-2/115 Exploration and utilization of geothermal energy László Lenkey  
6 credits, theory, optional, no repetition

KÖR-2/116 New approaches to cultural geography Berki Márton  
6 credits, theory, optional, no repetition

KÖR-2/120 Theoretical and practical solutions of environmental technologies Kardos Levente  
6 credits, theory, optional, no repetition

KÖR-2/121 Global and regional climate scenarios Pongrácz Rita  
6 credits, theory, optional, no repetition

KÖR-2/122 Trends in modern ecology Herczeg Gábor, Szentesi Árpád, Török János  
6 credits, theory, optional, no repetition

KÖR-2/123 Raman spectroscopy and its applications to environmental science Vácz Tamás  
6 credits, theory, optional, no repetition

KÖR-2/124 Genetic dissection of beneficial interactions between legumes and arbuscular mycorrhiza fungi and nitrogen-fixing rhizobia Kaló Péter  
6 credits, theory, optional, no repetition

KÖR-2/125 Plant-fungi interactions Barna Balázs  
6 credits, theory, optional, no repetition

KÖR-2/128 Environmental isotopes Szabó-Krausz Zsuzsanna, Szabó Csaba  
6 credits, theory, optional, no repetition

KÖR-2/129 Oceanology Báldi Katalin  
6 credits, theory, optional, no repetition

KÖR-2/130 Future of the oceans Báldi Katalin  
6 credits, theory, optional, no repetition

KÖR-2/131 Sensory biophysics II.: visual, biomechanical, thermoreceptional and bioacoustical case studies Horváth Gábor

6 credits, theory, optional, no repetition  
KÖR-2/132 Microbial Ecology Tóth Erika  
6 credits, theory, optional, no repetition  
KÖR-2/133 Spatial Ecology: from Islands to Metacommunities Horváth Zsófia  
6 credits, theory, optional, no repetition  
KÖR-2/134 Instrumental element analysis for biological samples Fodor Ferenc  
6 credits, theory, optional, no repetition  
KÖR-2/136 Advanced data analysis and visualization by R programming  
Szabó-Krausz Zsuzsanna, Virág Attila  
6 credits, theory, optional, no repetition  
KÖR-2/137 Water, society, economy Gyuris Ferenc  
6 credits, theory, optional, no repetition

KÖR-2/-201 Special topics in environmental science I.  
6 credits, theory, optional, no repetition  
KÖR-2/202 Special topics in environmental science II.  
6 credits, theory, optional, no repetition  
KÖR-2/203 Special topics in environmental science III.  
6 credits, theory, optional, no repetition  
KÖR-2/-204 Special topics in environmental science IV.  
6 credits, theory, optional, no repetition  
KÖR-2/205 Special topics in environmental science V.  
6 credits, theory, optional, no repetition  
KÖR-2/206 Special topics in environmental science VI.  
6 credits, theory, optional, no repetition  
KÖR-2/-207 Special topics in environmental science VII.  
6 credits, theory, optional, no repetition  
KÖR-2/208 Special topics in environmental science VIII.  
6 credits, theory, optional, no repetition  
KÖR-2/209 Special topics in environmental science IX.  
6 credits, theory, optional, no repetition  
KÖR-2/-210 Special topics in environmental science X.  
6 credits, theory, optional, no repetition  
KÖR-2/211 Special topics in environmental science XI.  
6 credits, theory, optional, no repetition  
KÖR-2/212 Special topics in environmental science XII.  
6 credits, theory, optional, no repetition

#### **KÖR/RK-KV Part-time Training / Credit Transfer**

Credits can be obtained by part-time doctoral training in other domestic or foreign institutions. The training program of part-time work, based on a proposal by the supervisor and program director, must be approved by the Council of the Doctoral School.

#### **KÖR/ET Accounting Previous Performance**

The Council of the Doctoral School, based on a proposal by the supervisor and program director, can recognize by credits previous studies and/or research fitting into the training program.

**The total number of credits obtained during the training period by credit transfer, part-time training, or by previous performance cannot be more than 50 % of the demanded academic credits.**

**Teaching activity: KÖR-2/OKT**

6 credits maximum in each semester

practice, optional, repeatable

The teaching credits are entered into Neptun by the Doctoral Group, based on the student's written request to the Head of the Doctoral School. The request must include details of the subject taught by the PhD student and must be supported by the lecturer responsible for the subject.

**Publication: KÖR-2/PUB**

**Q1 publication: 8 credits**

**Q2 publication: 6 credits**

**Q3 publication and book chapter: 3 credits**

**Conference lecture or poster  
with published abstract 2 credits**

**Conference lecture or poster  
without published abstract 1 credit**

Publication credits are entered into Neptun by the Doctoral Group, based on the student's written request to the Head of the Doctoral School. The request must include details of the publications, conference lectures and posters to be recognised and their conversion into credits as described above. It is sufficient to write a single such request at the end of the training period, before the award of the closing certificate (absolutorium). Q1-Q4 classification scheme of the MTMT publication data base has to be used.

Transitional provision: for publications and conference presentations accepted before 1 September 2022, the PhD students may opt for the publication credit award scheme valid until 31 August 2022.

**Research Module:**

**KÖR-2/KUT Supervised research**

In the first two years, 15 credits per semester (60 in total) and in the second two years, 30 credits per semester (120 in total) may be accumulated.

30 hours of student activities (learning, research, teaching and others) = 1 credit point  
optional, repeatable

Acquisition of skills for scientific research, active participation in research  
24 Hours/week.

## Evaluation and control

Fulfillments of requirements of a given course is evaluated and recorded in the transcript by the lecturer on a five-point scale (1-2-3-4-5, 1: failed ..... 5: excellent).

Research activities are evaluated and recorded in the transcript by the supervisor on a three-point scale (excellent – acceptable - failed).

Credits are approved by the program directors.

## Subject list of the Complex Exam

After finishing the 2nd year (4 semesters), the students have to pass a Complex Exam, which is a mandatory prerequisite of continuing the training. Subjects for the Exam can be chosen from the following list:

Environmental Biology (KÖR-2/1):

### **Environmental microbiology**

Environmental and conservation biology

Ecology

Environmental health

Environmental science of water

Environmental Physics (KÖR-2/2):

Radiation in the environment

Environmental material science and technology

Renewable energy sources

Physics of environmental flows

Environmental biophysics

Environmental Chemistry (KÖR-2/3):

Chemistry of environmental systems

Environmental technologies

Instrumental methods of analytical chemistry

Bio-inorganic chemistry

Atmospheric chemistry

Reaction kinetics and its applications

Environmental Earth Sciences (KÖR-2/4):

Applied meteorology and climatology

Environmental geology

Environmental geochemistry

Environmental geography

Hydrogeology

Sustainability and social science research

At the registration for the complex exam, the student, in accordance with her/his supervisor, may suggest subjects from different programs, provided that it is justified by the interdisciplinary character of the research topic.