MONITORING AND DIAGNOSIS OF ENVIRONMENTAL QUALITY

(Environmental Engineering, 4th Year of study, 1st Semester)

Credit value (ECTS): 5

Course category: Domain discipline (mandatory)

Course holder: Assoc. prof. Raluca-Maria HLIHOR, PhD

Objectives of the discipline (course and practical activity)

The discipline *Monitoring and diagnosis of environmental quality* aims to address the concept of environmental quality monitoring as a whole, the practical ways of carrying it out, the ways of obtaining environmental data, the way of processing these data, as well as the selection of environmental indicators in order to analyze the quality of environmental factors.

Contents (syllabus)

Course (chapters/subchapters)
1. The concept of environmental monitoring
1.1. Defining the concept of monitoring
1.2. The aim of monitoring
1.3. Principles of environmental monitoring
1.4. Objectives of environmental monitoring
1.5. Parameters covered in environmental monitoring
1.6. Data processing methods
1.7. The Shared Environmental Information System
2. Water quality monitoring
2.1. General concepts
2.2. Identifying parameters for water monitoring
2.3. Frequency of water monitoring
2.4. Typical water quality monitoring programs
2.5. Organization of the water monitoring network
2.6. Water Framework Directive
2.7. Integrated water resources management
2.8. Integrated Water Monitoring System in Romania
3. Air quality monitoring
3.1. General concepts
3.2. Monitoring of emissions and sources
3.3. Monitoring of key parameters in pollutant transfer and diffusion
3.4. Monitoring of immissions
3.5. Monitoring of effects
3.6. Emission inventory
3.7. Inventory methodologies
3.8. Air quality monitoring system design
3.9. Air quality monitoring system in Romania

Practical activity
1. Work protection instructions in the *Monitoring and diagnosis of environmental quality Laboratory* Physico-chemical indicators of water for water quality monitoring
2. Water sampling for laboratory analysis (field work)
3. Rapid analysis of water samples using reagent kits for visual determinations (pH, NH_4^+, NO_3^-, NO_2^-, K^+, PO_4^{3-})

4. Spectrophotometric determination of nitrate concentration in water
5. Spectrophotometric determination of nitrite concentration in water
6. Spectrophotometric determination of phenol concentration in water
7. Spectrophotometric determination of heavy metals concentration in water
9. Overview. Final conclusions on the analyses carried out
10. Laboratory colloquium

Bibliography

1. Artiola J., Pepper I.L., Brusseau M.L., 2004 - *Environmental monitoring and characterization*, Elsevier Science & Technology Books.
2. Campbell M. (Ed.), 1997a - *Sensor systems for environmental monitoring: 1st. edition sensor technologies*, London; New York : Blackie Academic & Professional.
3. Campbell M. (Ed.), 1997b - *Sensor systems for environmental monitoring: vol. 2: environmental monitoring*, London; New York: Blackie Academic & Professional.
4. Ciolpan O., 2005 - *Monitoringul integrat al sistemelor ecologice*, Ed. Ars Docendi, București.
5. Crețescu I., Șoreanu G., 2013 - *Tehnologii de achiziție, monitorizare și diagnoză a factorilor de mediu*, Ed. Ecozone, Iași.
6. Healy M., Wise D.L., Moo-Young M. (Eds.), 2001 - *Environmental monitoring and biodiagnostics of hazardous contaminants*, Ed. Springer Science & Business Media.
7. Hlihor R.M., 2022 – *Monitorizarea și diagnoza calității mediului*, În: *Manual de practică specializarea Ingineria mediului*, Volumul II, Stan T. (Ed.), Ed. "Ion Ionescu de la Brad", Iași.
8. Hlihor R.M., Simion I.M., Filote C., Roșca M., Cozma P., Apostol M., Gavrilescu M., 2022 - *Exploatarea tehnologiilor prietenoase cu mediul în vederea îndepărtării poluanților persistenți din apele uzate*, Ed. "Ion Ionescu de la Brad", Iași.
9. Mihăiescu R., 2014 - *Monitoringul integrat al mediului*, Cluj –Napoca.
10. Wiersma G.B. (Ed.), 2004 - *Environmental monitoring*, CRC Press.

Evaluation

Evaluation form	Evaluation Methods	Percentage of the final grade
Exam	Written examination	70%
Evaluation of the activity during the semester	Written and oral assessments during the semester Laboratory colloquium	30%

Contact

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MONITORING AND DIAGNOSIS OF ENVIRONMENTAL QUALITY

(Environmental Engineering, 4th Year of study, 2nd Semester)

Credit value (ECTS): 4

Course category: Domain discipline (mandatory)

Course holder: Assoc. prof. Raluca-Maria HLIHOR, PhD

Objectives of the discipline (course and practical activity)

The discipline *Monitoring and diagnosis of environmental quality* aims to address the concept of environmental quality monitoring as a whole, the practical ways of carrying it out, the ways of obtaining environmental data, the way of processing these data, as well as the selection of environmental indicators in order to analyze the quality of environmental factors.

Contents (syllabus)

Course (chapters/subchapters)
1. Soil quality monitoring
1.1. Introductory notes
1.2. Pressures on soil quality status
1.3. Soil monitoring
1.4. Soil quality monitoring systems
1.5. National and international soil monitoring programs
2. Biological monitoring
2.1. Introductory notes
2.2. Using bioindicators to assess the quality of environmental compartments
2.3. Stress induced by environmental contaminants on plants
2.4. Plant capacity to translocate, bioconcentrate and bioaccumulate heavy metals: plant response and detoxification mechanisms
3. Process modeling and optimization in environmental engineering
3.1. Introductory notes
3.2. Evaluation and modeling of experimental data obtained at laboratory scale: methodologies and methods
3.3. Mathematical modeling of environmental data through regression analysis and process optimization

Practical activity
1. Physical, chemical and biological soil characterization
2. Soil sampling for laboratory analysis (field work)
3. Soil quality. Standards on soil quality. Analysis of quality indicators
4. UV-VIS molecular absorption spectrometry. Introduction. Principle of the method. Analytical applications of UV-VIS molecular absorption spectrometry. Practical examples of calibration curves for different categories of pollutants
5. Biomonitoring of contaminated soils using different plant species. Introduction. Principle of the method. Reagents and apparatus. Procedure. Calculation of results. Interpretation of results
6. Air sampling for quality monitoring (field work)
7. Overview. Final conclusions on the analysis
8. Laboratory colloquium

Project
1. Creation of a poster project on different research topics concerning the application of biomimicry in Environmental Engineering Training students in designing, making and communicating information using poster materials
2. Description of the main objective presented and the specific objectives
3. Impact of the project presented as a poster
4. Conclusions and assessment

Bibliography

1. Artiola J., Pepper I.L., Brusseau M.L., 2004 - *Environmental monitoring and characterization*, Elsevier Science & Technology Books.
2. Campbell M. (Ed.), 1997a - *Sensor systems for environmental monitoring: 1st. edition sensor technologies*, London; New York : Blackie Academic & Professional.
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4. Ciascai L., 2010 - *Conceperea şi realizarea materialelor didactice: posterul*, Romanian Journal of Education, 1(1), 1-6.
5. Ciolpan O., 2005 - *Monitoringul integrat al sistemelor ecologice*, Ed. Ars Docendi, București.
6. Crețescu I., Șoreanu G., 2013 - *Tehnologii de achiziție, monitorizare și diagnoză a factorilor de mediu*, Ed. Ecozone, Iași.
7. Gavrilescu M. (Ed.), Diaconu M., Bulgariu L., Volf I., Catrinescu C., Smaranda C., Cozma P., Hlihor R.M., Ghinea C., Apostol L. C., Comăniță E.D., Roșca M., Vasilică S.I., 2019 - *Explorarea și exploatarea abilităților microorganismelor, plantelor și a interacțiunilor dintre acestea pentru bioremedierea mediului*, Ed. Performantica, Iași.
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12. Mihăiescu R., 2014 - *Monitoringul integrat al mediului*, Cluj –Napoca.
13. Wiersma G.B. (Ed.), 2004 - *Environmental monitoring*, CRC Press.

Evaluation

Evaluation form	Evaluation Methods	Percentage of the final grade
Exam	Written examination	70%
Evaluation of the activity during the semester	Written and oral assessments during the semester Laboratory colloquium	30%
Project	Oral assessment of the project	100%

Contact

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