

SYLLABUS

1. Information regarding the programme

1.1 Higher education institution	Babeş-Bolyai University of Cluj-Napoca
1.2 Faculty	Environmental Science and Engineering
1.3 Department	Environmental Analysis and Assessment
1.4 Field of study	Environmental Engineering
1.5 Study cycle	Bachelor
1.6 Study programme / Qualification	Environmental Engineering

2. Information regarding the discipline

2.1 Name of the discipline	Hydrology and Oceanography						
2.2 Course coordinator	Dr. Ing. Iulia Ajtai						
2.3 Seminar coordinator	Dr. Ing. Iulia Ajtai						
2.4 Year of study	III	2.5 Semester	5	2.6. Type of evaluation	E	2.7 Type of discipline	DF. DD.Obl.

3. Total estimated time (hours/semester of didactic activities)

3.1 Hours per week	4	Of which: 3.2 course	2	3.3 laboratory	2
3.4 Total hours in the curriculum	56	Of which: 3.5 course	28	3.6 laboratory	28
Time allotment:					Hours
Learning using manual, course support, bibliography, course notes					20
Additional documentation (in libraries, on electronic platforms, field documentation)					15
Preparation for seminars/labs, homework, papers, portfolios and essays					15
Tutorship					5
Evaluations					5
Other activities:					10
3.7 Total individual study hours	70				
3.8 Total hours per semester	126				
3.9 Number of ECTS credits	5				

4. Prerequisites (if necessary)

4.1 curriculum	The knowledge acquired through the in-depth study of the content taught in the disciplines of Fundamentals of Environmental Engineering, Environmental Applied GIS, and Meteorology and Climatology facilitates the understanding and accessibility of the proposed topics. Additionally, participants will strengthen their operational conceptual foundation by activating and leveraging their pre-existing informational background.
4.2 competencies	The continuity of the applied valorization of the acquired knowledge allows a gradual reading of the chapters, in close relation to the theme of the discipline previously studied.

5. Conditions (if necessary)

5.1 for the course	• Amphitheater equipped with video projector
5.2 for the lab activities	• Room equipped with computers; The watercourses in the inner city of Cluj Napoca; Water Sample Analysis Laboratory

6. Specific competences acquired

Professional competencies	• Understanding of the main physico-chemical processes and dynamic phenomena and processes associated with water at all scales of development; • Developing skills for analyzing and interpreting hydrological data and information, to formulate concrete arguments and actions; • Using various forms of written and oral communication in relation to the specificities of the discipline; • Useful skills for the relevant interpretation of data provided by hydrometric and hydrological stations; • The ability to write a scientific paper in the field; • The skill to use field investigation methods and techniques for studying hydric characteristics/parameters.
Transversal competencies	• Deepening the methods, techniques, and research procedures used in Hydrology and Oceanography; • Raising awareness of global issues that interact with water: the rise of the global ocean level, quantitative and qualitative degradation of water, etc.; • Developing practical skills for interpreting and analyzing graphical information; • Applying GIS techniques for spatial analysis of hydrological data, process modeling, water resource monitoring, and interdisciplinary communication of results; • Developing the skills necessary for multidisciplinary cooperation, communication, and the establishment of partnership relationships based on the application of acquired knowledge and the development of transdisciplinary scientific reasoning.

7. Objectives of the discipline (outcome of the acquired competencies)

7.1 General objective of the discipline	○ Study and investigation of water processes, phenomena and parameters
7.2 Specific objective of the discipline	• Knowledge of the laws governing water processes and phenomena, as well as their regime and distribution, in order to identify the determining factors of the state and quality of the water environment; • Using scientific and disciplinary terminology (concepts, terms) to present relevant information; • Developing observational and environmental awareness through the interpretation of phenomena in the hydrosphere; • Analyzing the interactions between different categories of water; • Applying the discussed concepts in various case studies.

8. Contents

8.1 Course	Teaching methods	Remarks
Part I. Hydrology. <i>Introductory concepts. Definition and importance of hydrology in society. A brief history of the development of hydrology. Branches of hydrology.</i>	Presentation, Heuristic Conversation	2 hours
<i>The genesis of water. The molecular structure of water. Water resources and reserves. The water circuit and balance in nature. Properties of water in its natural state (physical, chemical, biological and bacteriological).</i>	Presentation, Heuristic Conversation	2 hours
<i>River Hydrology (Potamology). Hydrographic network and river system. Hydrographic basin. River valleys.</i>	Presentation, Heuristic Conversation, Explanation	2 hours
<i>Fluvial dynamics: Forces acting on river water. River currents. Flow velocity.</i>	Presentation, Heuristic Conversation, Explanation, Interactive Discussions	2 hours
<i>Liquid Flow</i>	Presentation Explanation	2 hours
<i>Remote Sensing and GIS in Hydrology</i>	Presentation Interactive Discussions	2 hours
<i>Presentation and Analysis of Documentary Film: Floods and Flooding. Flood Risk Management</i>	Multimedia exhibition with a specific theme for the discipline Interactive Discussions	2 hours
<i>Sediment Flow. Thermal Regime and Freezing Phenomena. Chemistry and Water Quality of Rivers</i>	Presentation Explanation, Case Study	2 hours
<i>Limnology Aspects</i>	Presentation, Interactive Discussions, Heuristic Conversation	2 hours
Part II. Oceanography <i>The origin and evolution of ocean and marine basins. Relief of marine and oceanic basins. Components of the Planetary Ocean. Oceans and seas.</i>	Presentation, Explanation	2 hours
<i>Physico-chemical properties of the Planetary Ocean</i>	Presentation, Brainstorming	2 hours

<i>The dynamics of the planetary ocean. Waves, Tides, Ocean Currents</i>	Presentation, Heuristic Conversation, Brainstorming, Explanation	4 hours
<i>Black Sea</i>	Presentation, Explanation, Heuristic Conversation, Case Study	2 hours
Bibliography		
1. Kenneth N. Brooks, Peter F. Ffolliott, Joseph A. Magner, (2012), Hydrology and the Management of Watersheds, John Wiley & Sons, Inc. 2. Brutsaert, W., (2005), Hydrology: An Introduction. Cambridge: Cambridge University Press. 3. Davie, T., (2008), Fundamentals of Hydrology, second edition, Fundamentals of Physical Geography Series, Routledge, London. 4. Dijkstra, H.A., (2008), Dynamical Oceanography, Springer, Netherlands		
8.2 Laboratory	Teaching methods	Remarks
Organization of the hydrometric network in Romania.	Presentation, Interactive Discussions	2 hours
Observation, measurement and processing of river water levels and depths and calculation of cross-sectional parameters	Presentation, Demonstration Practical exercise	2 hours
Determination of the flow velocity of river water. Determination and calculation of liquid flow	Presentation, Demonstration, Practical Exercise	2 hours
Practical application – Determination and calculation of liquid flow on unmonitored watercourses	Observations, measurements, interactive discussions	4 hours
Use of GIS techniques for the delimitation of river basins	Practical exercise	4 hours
Modeling of hydrographic networks and determination of high flood risk areas.	Practical exercise	4 hours
Analysis of surface water samples using multiparameter and turbidimeter. Practical application	Measurements, interactive discussions	4 hours
Presentation of the results obtained from the analysis of water samples	Presentation, interactive discussions	2 hours
Statistical analysis of some physico-chemical parameters characteristic for the Black Sea	Presentation, Demonstration, Interactive Discussions	2 hours
Colloquium	Interactive Discussions	2 hours
Bibliography		

1. Elizabeth M.Shaw, (1994), Hydrology in Practice, Third edition, Taylor & Francis.
2. Chow, V.T., Maidment, D.R., and Mays, L., (1988), "Applied Hydrology", McGraw-Hill Book Company
3. Herschy, R.W.(Ed.), (1978), "Hydrometry: Principles and Practices", Wiley Intersciences
4. Bedient P. B., Huber W. C. and Vieux., B. E.Hydrology and Floodplain Analysis, Pearson 4thEd., Philippine edition copyright 2010

9. Corroborating the content of the discipline with the expectations of the epistemic community, professional associations and representative employers within the field of the program

- The content of the discipline is in line with what is studied in other prestigious university centers in the country and abroad, being constantly updated according to the new scientific discoveries and the requirements of the labor market;
- The analysis of the opinions formulated by employers regarding the preferential attributes of the training of specialists resulted in a high degree of appreciation of their professionalism, which confirms the fact that the structure and content of the educational curriculum built for this study program are correct, comprehensive and efficient.

10. Evaluation

Activity Type	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share in the grade (%)
10.4 Course	Acquiring new knowledge	Written exam	66 %
	Ability to operate with new knowledge		
10.5 Laboratory	Ability to understand practical applications	Colloquium	33 %
	Active participation and degree of involvement in practical work sessions		
10.6 Minimum Performance Standard			
• Knowledge of the basic features of the physicochemical and dynamic characteristics of continental waters (definition, observation/measurement mode, variation, etc.); • Knowledge of the basic features of the physicochemical and dynamic characteristics of ocean waters			

Date

Signature of the course coordinator

Signature of the seminar coordinator

4.12.2024




Date of approval

Signature of the head of department

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