

## SYLLABUS

### 1. Information regarding the programme

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

### 2. Information regarding the discipline

|                            |                                      |              |          |                         |          |                        |                  |
|----------------------------|--------------------------------------|--------------|----------|-------------------------|----------|------------------------|------------------|
| 2.1 Name of the discipline | <b>Natural Hazards and Risks</b>     |              |          |                         |          |                        |                  |
| 2.2 Course coordinator     | <b>CS III Dr. Lucrina Ștefănescu</b> |              |          |                         |          |                        |                  |
| 2.3 Seminar coordinator    | <b>CS III Dr. Lucrina Ștefănescu</b> |              |          |                         |          |                        |                  |
| 2.4. Year of study         | <b>3</b>                             | 2.5 Semester | <b>6</b> | 2.6. Type of evaluation | <b>E</b> | 2.7 Type of discipline | <b>Mandatory</b> |

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

|                                                                                       |     |                      |    |                        |       |
|---------------------------------------------------------------------------------------|-----|----------------------|----|------------------------|-------|
| 3.1 Hours per week                                                                    | 4   | Of which: 3.2 course | 2  | 3.3 seminar/laboratory | 2     |
| 3.4 Total hours in the curriculum                                                     | 56  | Of which: 3.5 course | 28 | 3.6 seminar/laboratory | 28    |
| Time allotment:                                                                       |     |                      |    |                        | hours |
| Learning using manual, course support, bibliography, course notes                     |     |                      |    |                        | 20    |
| Additional documentation (in libraries, on electronic platforms, field documentation) |     |                      |    |                        | 20    |
| Preparation for seminars/labs, homework, papers, portfolios and essays                |     |                      |    |                        | 20    |
| Tutorship                                                                             |     |                      |    |                        | 8     |
| Evaluations                                                                           |     |                      |    |                        | 2     |
| Other activities: .....                                                               |     |                      |    |                        | 0     |
| 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   |                                                                                           |
| 4.2. competencies | Basic knowledge of natural risks and hazards, but these can be acquired during the course |

### 5. Conditions (if necessary)

|                                      |                                 |
|--------------------------------------|---------------------------------|
| 5.1. for the course                  | -                               |
| 5.2. for the seminar /lab activities | Projector and computer (laptop) |

## 6. Specific competencies acquired

|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Professional competencies | <ul style="list-style-type: none"> <li>• Understanding the concepts of natural hazards and risks</li> <li>• Knowledge of specific integrated activities, measures and tasks, legally organized and realized, with the aim of prevention and mitigation of natural disasters</li> <li>• Knowledge of institutional structures and actors in the domain of emergency situations generated by natural hazards.</li> <li>• Learning of specific measures to be taken in case of natural risks</li> <li>• Learning to implement and use the risk management process</li> <li>• Learning to use specific risk analysis methods</li> <li>• Learning to develop specific environmental studies: hazard identification, risk analysis.</li> </ul> |
| Transversal competencies  | <ul style="list-style-type: none"> <li>• Ability to conduct literature research;</li> <li>• Establish connections with other studied disciplines</li> <li>• Understand interdisciplinarity in the context of risk and natural disaster management;</li> <li>• Capacity for resuming and synthesizing analyzed scientific works.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                               |

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

|                                          |                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 7.1 General objective of the discipline  | <ul style="list-style-type: none"> <li>• Presentation of the natural risk management methodology and emergency situation caused by these risks, the legal framework for the specific measures and activities in the management procedure, institutional structures and specific measure for the mitigation of risks</li> </ul>                                                          |
| 7.2 Specific objective of the discipline | <ul style="list-style-type: none"> <li>• Coverage of the risk management terminology</li> <li>• Knowledge of methods and techniques used in the risk management</li> <li>• Presentation of the stages in the risk management and the specific actions</li> <li>• Study and knowledge of techniques and procedures for hazard identification, and environmental risk analysis</li> </ul> |

## 8. Content

| 8.1 Course                                                                                                                                                                                  | Teaching methods      | Remarks |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------|
| <b>NATURAL RISKS AND HAZARDS</b>                                                                                                                                                            |                       |         |
| 1. Introduction: motivation, methodology, terminology                                                                                                                                       | Lecture, discussions  |         |
| 2. Risk management: steps in the overall risk assessment: processes, methods, advantages. Distribution of the management process in function of risk types generating emergency situations. | Lecture, discussions  |         |
| 3. Emergency situations management                                                                                                                                                          | Lecture, discussions. |         |
| 4. Institutional structures involved in risk and emergency situations management                                                                                                            | Lecture, discussions. |         |
| 5. Legal framework related to risk and emergency situations management. Risk management strategies                                                                                          | Lecture, discussions. |         |
| 6. Typology of risks and their specific treatment measures: endogenous risks                                                                                                                | Lecture, discussions. |         |
| 7. Typology of risks and their specific treatment measures: exogenous risks                                                                                                                 | Lecture, discussions. |         |

| 8.2 Seminar / laboratory                                                      | Teaching methods                                        | Remarks             |
|-------------------------------------------------------------------------------|---------------------------------------------------------|---------------------|
| 1. Introduction. Related topics. Structure.                                   | Debates and discussions                                 |                     |
| 2. Natural phenomena generating risks and disasters. Typology, affected areas | Discussions, group exercises, scenario, and discussions |                     |
| 3. Methods for assessing risk perception. Questionnaire survey                | Discussions, group exercises                            |                     |
| 4. Example: Risk analysis for a given area                                    | Discussions, group exercises, case studies, scenarios   |                     |
| 5. Romania. Hazard, risk and seismic management                               | Discussions, group exercises, case studies, scenarios   |                     |
| 6. Floods management and emergency situations in Romania                      | Discussions, group exercises, case studies, scenarios   |                     |
| 7. Emergency situations management for extreme meteorological phenomena       | Discussions, group exercises, case studies, scenarios   |                     |
| 8. Synthesis on natural risk management                                       | Group exercises                                         |                     |
| 9. Stages of a case study on natural risks                                    | Group exercises                                         |                     |
| 10. Social Vulnerability Index applied to natural hazards                     | Group exercises                                         |                     |
| 11. Project – instructions and exercise                                       | Written project and presentation by students            | Seminar examination |
|                                                                               |                                                         |                     |

### Bibliography

1. B Wisner, P. Blaikie, T. Cannon, I. Davis; At Risk: Natural hazards, people's vulnerability and disasters, Routledge, London, 2004.
2. A. Randall: Risk and Precaution, Cambridge, UK, 2011.
3. European Environmental Agency: Environmental Risk Assessment: Approaches, Experiences and Information Sources, EEA, 1998.
4. C. E. Haque (Ed.): Mitigation of Natural Hazards and Disasters, Springer, Canada, 2005.
5. Frank P. Lees: Loss Prevention in the Process Industries: Hazard Identification, Assessment and Control, Second edition, United Kingdom, 1996.
6. N. Hyatt, *Guidelines for Process Hazards Analysis, Hazard Identification & Risk Analysis*, Ed. Dyadem Press, Ontario, 2003.
7. Ozunu, A., Senzaconi, F., Botezan, C., Ștefănescu, L., Nour, E., and Balcu, C., (2011), Investigations on natural hazards which trigger technological disasters in Romania, Nat. Hazards Earth Syst. Sci., 11, 1319-1325, doi:10.5194/nhess-11-1319-2011.
8. Babič, A., Lazar Sinković, N., & Dolšek, M. (2023). A model for communication and management support of natural hazards risk. *International Journal of Disaster Risk Reduction*, 90, 103672. <https://doi.org/10.1016/j.ijdr.2023.103672>
9. Cremen, G., Galasso, C., & McCloskey, J. (2022). Modelling and quantifying tomorrow's risks from natural hazards. *Science of The Total Environment*, 817, 152552. <https://doi.org/10.1016/j.scitotenv.2021.152552>
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11. Sköld Gustafsson, V., Andersson Granberg, T., Pilemalm, S., & Waldemarsson, M. (2024). Identifying decision support needs for emergency response to multiple natural hazards: An activity theory approach. *Natural Hazards*, 120(3), 2777–2802. <https://doi.org/10.1007/s11069-023-06305-2>
12. Painter, M.A., Shah, S.H., Damestait, G.C. *et al.* A systematic scoping review of the Social Vulnerability Index as applied to natural hazards. *Nat Hazards* **120**, 7265–7356 (2024). <https://doi.org/10.1007/s11069-023-06378-z>

Internet sites:

<http://www.emdat.be/>

<http://www.igsu.ro/>

<http://mahb.jrc.it/index.php?id=9>

Access for the references: Central University Library (BCU), Library of the Faculty of Environmental Science and Engineering.

Electronic Library of the Research Institute for Sustainability and Disaster Management based on High-Performance Computing (ISUMADECIP), Faculty of Environmental Science and Engineering.

## 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 course was designed based on a thorough analysis of the scientific literature in the field of natural risks, complemented by similar courses from the study programs of other European universities and adapted to the specifics of Romania. The selection of the presented information and concepts was grounded in relevant contributions from the scientific literature, as well as reports and information from national and local authorities. This approach ensures a solid theoretical foundation and practical applicability in the field of natural hazards risks.

## 10. Evaluation

| Type of activity                                                                                                                                                                                       | 10.1 Evaluation criteria                                                                    | 10.2 Evaluation methods               | 10.3 Share in the grade (%) |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|---------------------------------------|-----------------------------|
| 10.4 Course                                                                                                                                                                                            | Knowledge of concepts and terminology                                                       | Oral examination                      | 50%                         |
| 10.5 Seminar/lab activities                                                                                                                                                                            | The active participation of the students during the seminar                                 | Score                                 | 10%                         |
|                                                                                                                                                                                                        | The correctness of the project, accuracy of the presentation, correctness of the responses. | Writing of a project and presentation | 40 %                        |
| 10.6 Minimum performance standards                                                                                                                                                                     |                                                                                             |                                       |                             |
| <ul style="list-style-type: none"> <li>Successful passing of the exam is conditioned by the final grade that has to be at least 5.</li> <li>Minimum 80% presence at seminar/lab activities.</li> </ul> |                                                                                             |                                       |                             |

04.12.2024

CS III Dr. Lucrina Ștefănescu



Date of approval

Signature of the head of department