

# Syllabus

## *Course Description*

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| Course Title                   | Landscape ecology and ecosystem restoration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Course Code                    | 47071                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Course Title Additional        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Scientific-Disciplinary Sector | BIOS-01/C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Language                       | English                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Degree Course                  | Master in Environmental Management of Mountain Areas                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Other Degree Courses (Loaned)  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Lecturers                      | Prof. Leonardo Montagnani,<br><a href="mailto:leonardo.montagnani@unibz.it">leonardo.montagnani@unibz.it</a><br><a href="https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/24975">https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/24975</a>                                                                                                                                                                                                                                                                                                                                                                                  |
| Teaching Assistant             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Semester                       | First semester                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Course Year/s                  | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| CP                             | 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Teaching Hours                 | 36                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Lab Hours                      | 24                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Individual Study Hours         | 90                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Planned Office Hours           | 18                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Contents Summary               | <ul style="list-style-type: none"> <li>- Basic terms and concepts in ecology, and systematics and taxonomy</li> <li>- Introduction to the discipline and history of Landscape Ecology</li> <li>- Multifunctional and traditional landscapes</li> <li>- Patterns and processes in landscapes, and methodologies</li> <li>- Ecosystems and land-use types in mountain areas</li> <li>- Vegetation and its differentiation in landscapes</li> <li>- Ecosystem and landscape services, and urban landscapes</li> <li>- Interdisciplinary aspects in Landscape Ecology</li> <li>- Introduction to Restoration Ecology with history and concepts</li> <li>- Ecological concepts for ecosystem restoration and practical</li> </ul> |

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|                                  | <p>measures</p> <ul style="list-style-type: none"> <li>- References for ecosystem restoration, and monitoring control</li> <li>- Examples of ecosystems and land-use types and their restoration</li> <li>- Re-introduction of animals and plants</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Course Topics</b>             | <p>The course introduces the principles and approaches of Landscape Ecology and Ecosystem Restoration, with particular emphasis on mountain environments.</p> <p>Landscape Ecology.</p> <ul style="list-style-type: none"> <li>• Basic ecological concepts and principles of Landscape Ecology.</li> <li>• Landscape structure, patterns, processes and dynamics.</li> <li>• Multifunctional and traditional landscapes.</li> <li>• Mountain ecosystems, land-use and vegetation patterns.</li> <li>• Ecosystem and landscape services and interdisciplinary perspectives.</li> </ul> <p>Ecosystem Restoration</p> <ul style="list-style-type: none"> <li>• Principles and ecological foundations of Restoration Ecology.</li> <li>• Restoration objectives, reference ecosystems and practical measures.</li> <li>• Monitoring and evaluation of restoration success.</li> <li>• Restoration of ecosystems and land-use types, including plant and animal reintroduction.</li> </ul> <p>Applied activities</p> <p>Practical activities, analysis of case studies and scientific literature, short assignments and student presentations complement theoretical topics..</p> |
| <b>Keywords</b>                  | <p>Landscape Ecology; Ecosystem Restoration; Mountain Landscape Patterns and Dynamics; Restoration Monitoring and Evaluation; Plant and Animal Species Reintroduction.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Recommended Prerequisites</b> | <p>General Ecology</p> <p>Basic Botany</p> <p>Scientific English</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Propaedeutic Courses</b>      | <p>No</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Teaching Format</b>           | <p>The teaching will be provided as frontal lectures and exercises. Theoretical topics are complemented by practical activities, analysis of case studies and scientific literature, short assignments and student presentations.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Mandatory Attendance</b>      | <p>No</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Specific Educational</b>      | <p>Knowledge and understanding --&gt;</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

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| <p><b>Objectives and Learning Outcomes</b></p> | <p>- apply knowledge of landscape ecology, spatial planning and environmental rehabilitation in the sustainable management of mountain environments</p> <p>Ability to apply knowledge and understanding --&gt;<br/>In addition to having acquired a solid scientific-technological basis, the graduate of the Master's degree in "Environmental Management of Mountain Areas" acquires the ability to tackle and solve new problems. Thanks to a technical-scientific education, integrated with technological-managerial subjects, he or she is able to analyse, design, plan and manage the mountain territory and its specificities, vulnerabilities and characteristics. The graduate must also be able to coordinate interdisciplinary teams in the fields of ecology, restoration and functional maintenance of mountain ecosystems, agro-forestry management and socio-economic development.</p> <p>The tests (written and oral examinations, reports) and exercises involve the performance of specific tasks in which the student demonstrates mastery of tools, methodologies and critical autonomy.</p> <p>Communication skills --&gt;<br/>Graduates will be able to work professionally and scientifically in one or more foreign languages, since in addition to English (the official language of the course) in which all compulsory and part of the optional courses are offered, they will be able to follow optional courses offered in Italian or German. The Language Centre of the Free University of Bozen/Bolzano also offers students, in accordance with the policy for trilingualism that characterises the profile of the Free University of Bozen/Bolzano, the possibility of taking extracurricular courses at level (A1-C1) in Italian and German.</p> <p>Finally, the graduate will be able to effectively communicate what he or she has learnt to the different professional categories with which he or she works and has the ability, given the international nature of the degree course, to share projects with foreign interlocutors.</p> <p>Written and oral communication skills are developed in seminars, tutorials and training activities, which also include the preparation of written reports and documents and the oral presentation of</p> |
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these, compulsorily in English and possibly in Italian and German for optional courses.

The acquisition and assessment/verification of the achievement of communication skills is also envisaged through the writing of the final dissertation and its discussion in English. The Master's degree course promotes the acquisition of additional language skills (Italian/German), which are also aimed at increasing the ability of graduates to effectively market themselves on the labour market in part of the Alpine region (Austria-Switzerland-Italy-Germany).

Learning capacity -->

The graduate will have the ability to learn by synthesising the notions learnt in the course of studies, in order to address complex design issues, by expanding and updating the knowledge and technical skills acquired by using analysis, design and management tools appropriate to the situations in which the graduate operates. The graduate will be able to manage the different information networks in order to be able to continue to learn and thus to update himself/herself for his/her own cultural improvement and professional advancement. In addition, the graduate will be able to identify the appropriate training tools and paths for the development of their own cultural and specialist knowledge.

Learning skills are attained during all phases of the course of study. The Master's degree course enables students to consolidate their self-study skills, especially when they carry out group work on proposed topics; again, this ability is enhanced during a compulsory course, which involves group work, and subsequently in the preparation of the final thesis of an experimental nature. In particular, this practical course requires students to work in small groups (3-5) on a project (e.g., rural development plan for a mountainous area, rehabilitation project for a degraded terrestrial or river ecosystem) from its initial stages (identification of objectives, conceptual development of actions, collection of available data) through to interaction with the various stakeholders and communication activities towards society. The projects will take place under the supervision of two or more professors from the two universities involved, but also by having the students interact with professional firms and/or public technical offices that have already expressed interest and willingness to do so.

Learning ability is assessed through continuous forms of

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|                                                                                 | verification during the training activities and during the conduct of the activity related to the final examination.                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Specific Educational Objectives and Learning Outcomes (additional info.)</b> | <p>Students will be able to:</p> <ul style="list-style-type: none"> <li>- Apply landscape ecology and ecosystem restoration methods to mountain environments;</li> <li>-Analyse complex problems and select appropriate tools and solutions independently;</li> <li>-Communicate scientific topics and project outcomes effectively in written and spoken English;</li> <li>-Search, critically evaluate and apply scientific literature to case studies and restoration problems.</li> </ul> |
| <b>Assessment</b>                                                               | The final exam will be oral. Intermediate activities will be assessed and, together with participation in the exercise activity, will determine the final grade.                                                                                                                                                                                                                                                                                                                              |
| <b>Evaluation Criteria</b>                                                      | <p>Knowledge and understanding of landscape ecology and ecosystem restoration principles.</p> <p>Ability to apply appropriate methods to case studies and solve problems independently and with colleagues.</p> <p>Clarity of scientific communication and critical interpretation of scientific literature.</p> <p>Level of interaction during the classes.</p>                                                                                                                              |
| <b>Required Readings</b>                                                        | Presentations of the course topics will be provided in a dedicated Teams online folder.                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Supplementary Readings</b>                                                   | <p>1. Landscape Ecology</p> <p>Monica G. Turner &amp; Robert H. Gardner (2015)</p> <p>Landscape Ecology in Theory and Practice: Pattern and Process, 2nd ed. Springer.</p> <p>2. Ecosystem Restoration</p> <p>Karen D. Holl (2020)</p> <p>Primer of Ecological Restoration. Island Press.</p>                                                                                                                                                                                                 |

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|                                      | Additional readings will be indicated during the course.         |
| Further Information                  |                                                                  |
| Sustainable Development Goals (SDGs) | Sustainable cities and communities, Life on land, Climate action |