Freie Universität Bozen
Libera Università di Bolzano
Università Liedia de Bulsan

# Syllabus
# Course description

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| **Course title** | Advanced Geomatics and Environmental Impact Assessment |
| **Course code** | 47032 |
| **Scientific sector** | AGR/10 – ICAR/20 |
| **Degree** | Environmental Management of Mountain Areas |
| **Semester** | II |
| **Year** | I |
| **Academic year** | 2024/2025 |
| **Credits** | 6 (3+3) |
| **Modular** | *yes* |

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| **Total lecturing hours** | 36 (18+18) |
| **Total lab hours** | - |
| **Total exercise hours** | 24 (12+12) |
| **Attendance** | Recommended |
| **Prerequisites** | Familiarity with IT-Systems |
| **Course page** | https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/master-environmental-management-mountain-areas/ |

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| **Specific educational objectives** | The course belongs to the class related ("affini") in the curriculum "Environmental Management of Mountain Areas (EMMA)". It aims to teach both scientific foundations and practical methods.<br><br>The Environmental Impact Assessment module aims at providing students with:<br>- Theoretical knowledge to understand the main environmental assessment procedures, methods and techniques.<br>- Operational knowledge to design and conduct environmental impact assessments of projects.<br><br>Upon completion of this course, students will be able to:<br>1. Understand the main stages of environmental impact assessment of projects.<br>2. Select and apply suitable analytical tools to design and perform impact analysis on selected environmental components.<br>3. Assess and compare the impacts of alternative proposals.<br>4. Critically evaluate the quality of an environmental impact assessment.<br><br>The Advanced Geomatics module aims to provide students with all the knowledge and tools to employ, understand, |

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| | and exploit territorial data in Geographic Information System (GIS) environments. The students will be required to finalize a Project Work (PW) on a real case study, that can be done individually or in small groups of 2-3 people.<br>The course will span along the following steps as many frames of PW:<br>1. Analyze territorial datasets of various types (raster, vector data) in various geographic projections<br>2. performing geomatic and spatial analysis via basic numerical programming<br>3. synthetic approaches in the GIS environment for multi-scenario assessments and their relationship with existing agricultural infrastructures<br>4. write a technical report on the course's topics<br>5. read and discuss a scientific paper on the course's topics<br>Students will be introduced to employing GIS-based products in a technical report fashion. Previous knowledge of topography, hydrology, and some basics in programming are warmly encouraged. |

| **Module 1** | **Environmental Impact Assessment** |
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| **Scientific sector of the lecturer** | ICAR/20 |
| **Teaching language** | English |
| **Office hours** | See timetable |
| **Teaching assistant (if any)** | - |
| **List of topics covered** | The course will cover the following topics:<br>1. Introduction to environmental impact assessment (EIA): philosophy, concepts and legislation<br>2. Procedural and technical aspects in EIA: key stages and actors<br>3. EIA screening and scoping<br>4. Impact analysis: characterization, prediction and assessment of environmental impacts<br>5. Impact mitigation and off-sets<br>6. Cumulative effects and principles of sustainability assessment.<br>7. Case studies and applications relevant for mountain areas. |
| **Teaching format** | Lectures are combined with presentations and discussion of case studies and short assignments, using problem-based learning techniques.<br>Presentations, reading material and links to additional resources will be made available on the Reserve collection. |

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| **Module 2** | **Advanced Geomatics** |
| **Scientific sector of the lecturer** | AGR/10 |
| **Teaching language** | English |
| **Office hours** | See timetable |
| **Teaching assistant *(if any )*** | // |
| **Office hours** | Friday 12:00 – 13:00 (by email appointment) |
| **List of topics covered** | The course will cover the following topics:<br>1. *Geodesy*: analyze territorial datasets, e.g. raster and vector data (4 hrs of lecture + 4 hrs of exercise), in various geographic projections<br>2. *Geomatics*: employment of GIS-based software to clean the data and basic statistics through basic programming, and data georeferencing among different reference systems (2 hrs of lecture + 2 hrs of exercise)<br>3. *Spatial analysis*: application of spatial analysis and interpolation techniques in a GIS environment and/or with numerical programming to draw up maps and GIS-based products (6 hrs of lecture + 4 hrs of exercise)<br>4. *Uncertainty analysis*: identify and quantify the possible sources of uncertainty in the estimation of the quantities treated (2 hrs of lecture + 2 hrs of exercise); Synthetic approaches in a GIS environment for multi-scenario assessments and their relationship with existing agricultural infrastructures (2 hrs of lecture)<br>5. *Communication skills/1*: preparing a technical report on real case studies using GIS-based products (2hrs of lecture)<br>6. *Communication skills/2*: discussing a scientific paper on the topic of the course |
| **Teaching format** | The lectures will be composed of presentations (lectures) and exercises on the computer. The presentations will be available on the Unibz reserve collection or by request to the lecturer. Students are invited to bring their own laptops for exploiting the assignments. Each group of exercise hours will follow the related group of lecture hours. |

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| **Learning outcomes** | **Knowledge and understanding** of i) basic and applied concepts in Environmental Impact Assessment; ii) usefulness of different tools and techniques to support impact assessment;<br><br>**Applying knowledge and understanding** to i) proposing solutions to impact assessment problems by |

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| | assessing and comparing possible alternatives<br><br>**Making judgements** on the most suitable approaches, methodologies and workflows to address a broad range of problems in environmental impact assessment, and on the datasets required to perform the analysis.<br><br>**Communication skills** to present basic concepts and case study applications related to impact assessment to both a technical and non-technical audience clearly, concisely and using adequate technical terminology.<br><br>**Learning skills** to autonomously deepen and update the knowledge acquired during the course seeking relevant information on scientific and technical literature, for their future professional and/or academic studies |

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| **Assessment** | The assessment will be carried out through i) written report (student assignments) (Module 1 and 2); ii) an oral exam about the PW and the discussion a literature paper on the course's topics, chosen by the Candidate (Module 2); |
| **Assessment language** | English |
| **Evaluation criteria and criteria for awarding marks** | The final grade for the entire course will be calculated as the average of the final grades obtained in the two modules.<br><br>The mark for Module 1 will be assigned based on a group "case study" report (70%) and an individual in-class presentation/individual written report on a selected topic (30%).<br>The assessment criteria for the written reports include: soundness of the proposed approach; clarity and conciseness of the text; capability to refer to relevant literature; critical thinking; mastery of the technical language.<br><br>The mark for Module 2 will be assigned during an oral exam. The latter will serve to evaluate how the Candidate exploited the PW assignment and to discuss each or some of the course topics employed for its development.<br>The criteria for the PW evaluation include: critical thinking; clarity and motivation underlying the chosen solution; and the capability to refer to the documentation to solve the problem. The students can develop PW individually or in small groups (2-3 people). Each person in a working group will be responsible for each part of the |

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| | PW. The PW report will be sent in a unique PDF file by the students to the lecturer before the oral examination.<br>Furthermore, each Candidate will choose, present, and briefly discuss one of the scientific papers related to the course's topics, suggested and made available by the Lecturer during the course.<br>Relevant for the oral exam assessment are correctness and clarity of answers, mastery of the technical language, and capability to establish relationships between different topics, and in the framework of the suggested literature. |

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| **Required readings** | • Scientific papers, technical documents and case study material provided in class |
| **Supplementary readings** | • Additional scientific papers and case study material provided in class |