Syllabus

Course Description

Course Title	Advanced geomatics and environmental impact assessment
Course Code	47032
Course Title Additional	
Scientific-Disciplinary Sector	
Language	English
Degree Course	Master in Environmental Management of Mountain Areas
Other Degree Courses (Loaned)	
Lecturers	Prof. Davide Geneletti, Davide.Geneletti@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/35030 dr. Massimiliano Schiavo, Massimiliano.Schiavo@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/51418
Teaching Assistant	
Semester	Second semester
Course Year/s	1
CP	6
Teaching Hours	36
Lab Hours	24
Individual Study Hours	90
Planned Office Hours	18
Contents Summary	- Introduction to environmental impact assessment (EIA): philosophy, concepts and legislation - Procedural and technical aspects in EIA: key stages and actors - EIA screening and scoping - Impact analysis: characterization, prediction and assessment of environmental impacts - Impact mitigation and off-sets

	- Cumulative effects and principles of sustainability assessment - Case studies and applications relevant for mountain areas - Geodesy: analyse territorial datasets - Geomatics: employment of GIS-based software and data georeferencing - Spatial analysis and interpolation - Uncertainty analysis - Communication skills 1 (preparing a technical report on real case studies using GIS-based products) - Communication skills 2 (discussing a scientific paper on the topic of the course)
Course Topics	Advanced Geomatics: - basics of geodesy - basics of cartography - basics of topography - basics of spatial statistics - basics of spatial interpolation - fundamental plugins in QGIS (free software) - basics of programming to manage data and outputs (MATLAB online free version) - basics of GPS - use of territorial datasets Environmental Impact Assessment: The course will cover the following topics: 1. Introduction to environmental impact assessment (EIA): origin, purposes, and legislative framework 2. Procedural and technical aspects in EIA: key stages and actors 3. EIA screening and scoping (purposes and main techniques) 4. Impact analysis: characterization, prediction and assessment of environmental impacts 5. Impact mitigation and off-sets 6. Cumulative effects and principles of sustainability assessment; 7. Case studies and application examples, with particular focus on mountain areas.
Keywords	Advanced Geomatics: topography, geomatics, geostatistics, spatial analysis Environmental Impact Assessment: biodiversity, Impact Mitigation, Sustainability

Recommended Prerequisites	
Propaedeutic Courses	No
Teaching Format	Advanced Geomatics: - frontal lectures, including: (i) oral notes, (ii) projected notes via slides (in English), and (iii) written notes via blackboard teaching - mini-assignment during the course to be completed before the written test - written test (2h) - brief field exercise with GPS - use of freely available online territorial datasets Environmental Impact Assessment: Lectures are combined with presentation and discussion of case studies, short assignments and a field-trip, using also problem-based learning techniques.
Mandatory Attendance	No
Specific Educational Objectives and Learning Outcomes	Knowledge and understanding -->
- apply spatial information systems for land management and planning
- assess the natural hazards typical of mountain environments and their impact on society, identifying the most appropriate mitigation strategies
- collaborate with other professionals in the fields of architecture, engineering and natural sciences Ability to apply knowledge and understanding -->
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. Autonomy of judgement -->
Autonomy of judgement is developed by means of training aimed at stimulating students' critical analysis. This includes the use of case studies, simulations using spreadsheets and videos, the critical reading and discussion of scientific articles, as well as specialised seminars conducted by experts from the forestry and environmental sector.
The assessment of the autonomy of judgement acquired by the

	students is entrusted to the individual lecturers responsible for the training activities, who will assess it through oral and/or written reports on specific topics and/or through the examination. Communication skills --> 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. 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. 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 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 verification during the training activities and during the conduct of the activity related to the final examination.
Specific Educational Objectives and Learning Outcomes (additional info.)	
Assessment	Advanced Geomatics: written test 2h Environmental Impact Assessment: oral discussion
Evaluation Criteria	Advanced Geomatics and Environmental Impact Assessment: clarity, scientific robustness of the discussion, problem solving, critical thinking
Required Readings	Advanced Geomatics: lecture notes, including both slides and personal notes taken during the lessons Environmental Impact Assessment: The reading material includes

	the references mentioned during lectures and uploaded or cited in the presentations made available on OLE. This material includes scientific reports, book chapters and scientific papers, guidelines and case-study documents.
Supplementary Readings	Advanced Geomatics: • QGIS free documentation: https://docs.qgis.org/3.40/en/docs/index.html • QGIS User's Guide (in Italian): https://docs.qgis.org/3.16/pdf/it/QGIS-3.16-DesktopUserGuide-it.pdf • Handbook of Big Geospatial Data. Werner and Chiang Eds. (2021). Springer International Publishing. • Isaaks, E. H., & Srivastava, R. M. (1989). An introduction to applied geostatistics. Oxford University Press. Environmental Impact Assessment: Selected introductory textbooks on Environmental Impact Assessment (e.g., Glasson et al., Therivel et al, Morrison-Saunders)
Further Information	
Sustainable Development Goals (SDGs)	Quality education, Gender equality, Clean water and sanitation, Life on land, Industry, innovation and infrastructure, Sustainable cities and communities, Affordable and clean energy

Course Module

Course Constituent Title	Advanced geomatics
Course Code	47032A
Scientific-Disciplinary Sector	AGRI-04/C
Language	English
Lecturers	dr. Massimiliano Schiavo, Massimiliano.Schiavo@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/51418
Teaching Assistant	
Semester	Second semester
CP	3
Responsible Lecturer	

Teaching Hours	18
Lab Hours	12
Individual Study Hours	45
Planned Office Hours	9
Contents Summary	- Geodesy: analyse territorial datasets - Geomatics: employment of GIS-based software and data georeferencing - Spatial analysis and interpolation - Uncertainty analysis - Communication skills 1 (preparing a technical report on real case studies using GIS-based products) - Communication skills 2 (discussing a scientific paper on the topic of the course)
Course Topics	- basics of geodesy - basics of cartography - basics of topography - basics of spatial statistics - basics of spatial interpolation - fundamental plugins in QGIS (free software) - basics of programming to manage data and outputs (MATLAB online free version) - basics of GPS - use of territorial datasets
Teaching Format	- frontal lectures, including: (i) oral notes, (ii) projected notes via slides (in English), and (iii) written notes via blackboard teaching - mini-assignment during the course to be completed before the written test - written test (2h) - brief field exercise with GPS - use of freely available online territorial datasets
Required Readings	• lecture notes, including both slides and personal notes taken during the lessons
Supplementary Readings	• QGIS free documentation: https://docs.qgis.org/3.40/en/docs/index.html • QGIS User's Guide (in Italian): https://docs.qgis.org/3.16/pdf/it/QGIS-3.16-DesktopUserGuide-it.pdf

	• Handbook of Big Geospatial Data. Werner and Chiang Eds. (2021). Springer International Publishing. • Isaaks, E. H., & Srivastava, R. M. (1989). An introduction to applied geostatistics. Oxford University Press.

Course Module

Course Constituent Title	Environmental impact assessment
Course Code	47032B
Scientific-Disciplinary Sector	CEAR-12/A
Language	English
Lecturers	Prof. Davide Geneletti, Davide.Geneletti@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/35030
Teaching Assistant	
Semester	Second semester
CP	3
Responsible Lecturer	
Teaching Hours	18
Lab Hours	12
Individual Study Hours	45
Planned Office Hours	9
Contents Summary	- Introduction to environmental impact assessment (EIA): philosophy, concepts and legislation - Procedural and technical aspects in EIA: key stages and actors - EIA screening and scoping - Impact analysis: characterization, prediction and assessment of environmental impacts - Impact mitigation and off-sets - Cumulative effects and principles of sustainability assessment - Case studies and applications relevant for mountain areas
Course Topics	The course will cover the following topics: 1. Introduction to environmental impact assessment (EIA): origin, purposes, and legislative framework

	2. Procedural and technical aspects in EIA: key stages and actors 3. EIA screening and scoping (purposes and main techniques) 4. Impact analysis: characterization, prediction and assessment of environmental impacts 5. Impact mitigation and off-sets 6. Cumulative effects and principles of sustainability assessment; 7. Case studies and application examples, with particular focus on mountain areas.
Teaching Format	Lectures are combined with presentation and discussion of case studies, short assignments and a field-trip, using also problem-based learning techniques.
Required Readings	The reading material includes the references mentioned during lectures and uploaded or cited in the presentations made available on OLE. This material includes scientific reports, book chapters and scientific papers, guidelines and case-study documents.
Supplementary Readings	Selected introductory textbooks on Environmental Impact Assessment (e.g., Glasson et al., Therivel et al, Morrison-Saunders)