

# International Master course (MSc) in Management and Design of the Mountain Environment and Landscape

with 2 curricula (Trento LM 3 & Bolzano/Innsbruck LM 73)

State: Sept., 2nd 2011

## Piano degli studi - Studienplan (LM-73, LM-3)

1<sup>st</sup> year (Bolzano)

Materia – Fach	Settore scientifico Wissenschaftlicher Bereich	CFU KP	Content and teaching objective
<b>Compulsory courses</b>			
Landscape ecology (including grasslands and pastures)	BIO/03 (Tappeiner UIBK/Zerbe UNIBZ)	<b>6</b>	<p><b>Content course part Tappeiner (3 cdt) and Zerbe (3 cdt):</b> Basic concepts, principles, and methods of landscape ecology, as well as its important applications in nature conservation, resource management, and landscape planning; landscape history and landscapes in Central Europe, incl. excursion</p> <p><b>Teaching objective:</b> Graduates will know structure, processes, use and dynamics of landscapes – theory and practice</p>
Geomatics and informatics applied to land management	ICAR/06 GIS and remote sensing (Stampfl UIBK)	<b>6</b>	<p><b>Content:</b> GIS and global positioning systems (lecture); advanced engagement in methods and topics presented in the lecture, based on a specific project (project).</p> <p><b>Teaching objective:</b> Graduates will be capable to transfer</p>

			modern spatio-temporal analyzing techniques in landscape ecology to smaller interdisciplinary research contexts, to analyse results, and to interpret implications critically
	AGR/09 Information tools to support process management (Mazzetto, UNIBZ)	3	<b>Content:</b> Definition of a conceptual model for designing and use of Information Systems for agri-environmental enterprises; IT solutions for environmental monitoring; use of DBMS  <b>Teaching objective:</b> Concepts and methods to deal with environmental management problems through IT; practical PC-lab applications
Landscape architecture A: Landscape design: theory and practices	ICAR/15 (UNITN/UIBK)	9	<b>Content:</b> Concepts and methods of Landscape Architecture, inventory of practices and approaches; design tools and applications.  <b>Teaching objective:</b> Understanding purposes and methods of Landscape architecture; being able to use design tools, experimenting design solutions.
Landscape architecture B: Ecologically based landscape planning	ICAR/15 (UNITN)	9	<b>Content:</b> Concepts and methods of ecologically based landscape planning; inventory of practices and approaches; planning tools and applications.  <b>Teaching objective:</b> Understanding purposes and methods of ecologically based Landscape planning; being able to use planning tools, experimenting planning solutions.
Environmental assessment and economics	AGR/01 Environmental economics (UNIBZ)	6	<b>Content:</b> Objectives and methods of environmental economics with examples from restoration projects and nature conservation management  <b>Teaching objective:</b> Knowledge in the field of basic and applied environmental economics; methodological skills
	ICAR/20	6	<b>Content:</b> Environmental assessment concepts and methods; environmental impact assessment, strategic environmental

	Environmental assessment (Diamantini, UNITN)		assessment; assessment tools and applications.  <b>Teaching objective:</b> Knowledge of assessment procedures, methods and tools. Applications of this knowledge.
Management of mountain forests	AGR/05 (Tonon, UNIBZ)	9	<b>Content:</b> Multi-objective forest management with special emphasis to protection forestry of mountain forests  <b>Teaching objective:</b> Understanding the natural dynamics of mountain forests and their response to natural and human-induced drivers
Statistics	Included as "other activities" for the Italian requirements  (Seeber, UIBK)	3	<b>Content</b> Combined lecture and exercise: Students will get a first insight into the development of experimental designs for ecological studies and learn basic statistical methods.  <b>Teaching objective:</b> Graduates of this course will be able to deal with statistical datasets and to interpret results of statistical analyses in an ecological sense
<b>Total compulsory</b>		<b>57</b>	
<b>Optional courses</b>	The following two courses are in alternative		
Fundamentals of Biology	<i>(this course will deal with ecological topics in order to improve the knowledge of students with a engineering or architectural background)</i> UIBK/UBZ	3	<b>Content:</b> Fundamentals in biology will allow the students, in particular those of them who studied other BSc programs than biology-related to percept and follow all other courses related to biology in this Master program. Special regard will be paid to ecology, incl. principles, methods and concepts.  <b>Teaching objective:</b> Graduates will be able to understand concepts, methods, and principles in biology, in particular ecology
Fundamentals of Applied physics	<i>(this course will deal with engineering topics in order to improve the knowledge of</i>		<b>Content:</b> This course aims to elucidate the principles and rules behind natural phenomena and understand them in a uniform manner. Particular attention will be paid to the recent development of science and technology with reference to

	<i>students with a biological/ecological background) (Diamantini, UNITN)</i>		issues such energy and environment.  <b>Teaching objective:</b> Graduates will be able to use the language of physics to describe some fundamental problems encountered in this Master Course
<b>Total</b>		<b>60</b>	

2<sup>nd</sup> year – L-73  
Curriculum title: Management of mountain areas

Materia – Fach -	Settore scientifico Wissenschaftlicher Bereich	CFU KP	Content and teaching objective
<b>Compulsory courses</b>			
Ecosystem restoration and bioengineering techniques (2 modules)	ICAR/15 (Rauch, Bockreis, UIBK /Zerbe UNIBZ)	<b>7</b>	<p><b>Content course part Rauch/Bockreis:</b> Basic and applied aspects of bioengineering techniques with focus on urban water and waste management</p> <p><b>Content course part Zerbe:</b> Basic and applied aspects of restoration ecology and ecosystem restoration with examples from Central Europe</p> <p><b>Teaching objective:</b> Concepts, techniques, and problems of ecosystem restoration, urban water and waste management</p>
Water and sediment management in mountain basins (2 modules)	AGR/08 (Aufleger, UIBK / Comiti, UNIBZ)	<b>8</b>	<p><b>Content course part Aufleger:</b> Basics in fluvial hydraulics, sediment transport and river stabilization methods focusing on mountain rivers</p> <p><b>Content course part Comiti:</b> Morphodynamics of mountain rivers, hydromorphological alterations in the context of the EU Water Framework Directive, evaluation of flood hazard and flood risk in mountain basins</p> <p><b>Teaching objective:</b> Understanding the natural dynamics of mountain rivers; assessment of their hydromorphological status and of the flood risk associated to them</p>
<b>Total Compulsory</b>		<b>15</b>	
<b>Optional courses</b>	The students have to choose 20 credits among the following		

	offered courses		
Productive ecosystems	AGR/03 (with a contribution of AGR/02 - AGR/05, AGR/19) (UNIBZ/UIBK)	5	<p><b>Content:</b> Ecosystem concept. Major ecological structural features of productive ecosystems with reference to tree and grass ecosystems, pastures and livestock farming. Thermal and radiation balance. Carbon cycle: net primary productivity, soil respiration, decomposition process, rhizodeposition, net ecosystem productivity. Nutrient fluxes and monitoring nutrient losses. Water needs and use; plant-soil water status. Energy use in the production processes. Measurement techniques.</p> <p><b>Teaching objective:</b> Understanding the role of carbon, nutrient and water cycles in productive ecosystems in order to maximize the use efficiency of natural resources involved in a sustainable agricultural production in mountain areas.</p>
Sociology of local development processes	(UNIBZ, Elsen + contract professor)	5	<p><b>Content:</b> Introduction to theoretical and practical approaches that explain social dynamics of local communities or guide planned social, ecological and economical development and change within participative processes (bottom-up-strategies).</p> <p><b>Teaching objective:</b> Community structure analyses; action research; methods and instruments of empowerment; theory and practice of community based economy and management of commons</p>
Mountain Technologies	(Mazzetto, UNIBZ)	7.5	<p><b>Content:</b> Machines and technological systems for managing natural and anthropogenic environments in mountain areas, with special regard to forest, grazing, livestock, and cable services systems.</p> <p><b>Teaching objective:</b> Problem solving concepts, methods, and approaches for the use of technologies in mountain areas</p>

Natural hazards in mountain basins	GEO/04 (Comiti, UNIBZ / Aufleger, UIBK)	7,5	<p><b>Content:</b> Fundamentals of geomorphology; geomorphic process domains (glacial, periglacial, colluvial, alluvial); mass wasting processes (landslides, debris flows, and snow avalanches) and their associated hazards.</p> <p><b>Teaching objective:</b> Understanding the geomorphological processes in mountain landscapes; assessment of the probability of occurrence of mass wasting events; identification of high-hazard areas</p>
Advanced landscape ecology	(Leitinger, UIBK)	5	<p><b>Content:</b> Principles of LPA with GIS and related geo-statistical analyses in landscape ecology, as well as deepening of learning contents on the basis of state-of-the-art literature.</p> <p><b>Educational objectives:</b> The graduates have acquired knowledge of Geographic Information Systems as well as in geo-statistics which enables them to analyze and evaluate landscape ecological research questions. The graduates are able to work individually and as team members to identify problems in their subject and to solve them by selecting and applying suitable methods.</p>
Statistics: Experimental Designs and Statistical Methods	(J. Seeber, UIBK)	7,5	<p><b>Content:</b> Combined lecture and exercise: Students will learn how to develop experimental designs for ecological studies, how to correctly apply statistical methods and interpret results of statistical analyses; case studies in ecological research will be analysed and discussed, substantiating the contents learned in the combined lecture and exercise</p> <p><b>Teaching objective:</b> Graduates of this course will be able to deal with statistical problems and to interpret their results in an ecological sense</p>
Interdisciplinary Environmental Scenario Analysis	(Tappeiner, UIBK)	7,5	<p><b>Content:</b> Presentation and discussion of established concepts, advanced methods and interdisciplinary analyses in view of global environmental problems; (project) based on specific issues and case studies, the understanding and</p>

			<p>reflection of applicable techniques and interdisciplinary methods will be trained</p> <p><b>Teaching objective:</b> Graduates obtain the ability to contrast established concepts and advanced methods of analyses of environmental problems. They work in teams for matching inter- and transdisciplinary questions. They will be capable to identify, adapt, evaluate, and critically discuss scientific methods and standards</p>
Global change ecology	(Bahn, Wohlfahrt, Sommaruga, UIBK)	7,5	<p><b>Content:</b> Topical scientific findings on global changes and their feedback on ecological processes are taught (lecture); Consolidation of the lecture topics based on current scientific literature (seminar)</p> <p><b>Teaching objective:</b> Graduates are able to link, evaluate, and communicate the background and topical scientific findings on global changes and their feedback on ecological processes.</p>
Biodiversity of Aquatic and Terrestrial Ecosystems	(Bahn, Füreder, Traugott, UIBK)	7,5	<p><b>Content:</b> Biological diversity in terrestrial and aquatic habitats/ ecosystems, its causes and consequences for communities and ecosystem processes (lecture); deepening of topics presented in the lecture, practical implications and case studies (exercise)</p> <p><b>Teaching objective:</b> The successful participant will be able to analyze and evaluate local, regional and global patterns of biodiversity in terrestrial and aquatic ecosystems as well as their causes, adaptations and implications for ecosystem processes.</p>
Assessment of Natural Habitats and Biotic Communities	(Füreder, UIBK)	7,5	<p><b>Content:</b> Ecological assessment of freshwater ecosystems, terrestrial biotopes and the landscape (national and international approaches, methods for the characterisation and evaluation of the landscape and ecosystems, their biotic components and habitats, bioindication of environmental</p>

			<p>change)(lecture); Practical implementation, field investigations, laboratory methods, data analysis, computer-assisted evaluation (exercise).</p> <p><b>Teaching objective:</b> The aim of this unit is to identify, discuss, evaluate, and apply national and international directives, norms and sets of indicators for the assessment of ecosystem structure and functions, ecological integrity and degradation</p>
Use and Conservation of Mountain Ecosystems	(Füreder, UIBK)	7,5	<p><b>Content:</b> Use and protection of the alpine landscape Fundamentals in conservation, management and monitoring in mountain landscapes; Preparation of actual topics in aquatic and terrestrial conservation, discussion with landscape managers, authorities and scientists</p> <p><b>Teaching objective:</b> The aim of this unit is to understand the principles of nature conservation and to apply this knowledge with the help of practical examples</p>
Interdisciplinary excursion	UIBK & UNIBZ	7,5	<p><b>Content:</b> Analysis of habitat or ecological question using a multi-disciplinary and/or trans-disciplinary approach</p> <p><b>Teaching objective:</b> Graduates will be capable to individuate the multi disciplinary and trans-disciplinary interactions between an example habitat and its social and political environment, to abstract general relationships and to transfer it to new situations</p>
Scientific practice: presentation and publishing	(UIBK/UNIBZ)	7,5	<p><b>Content:</b> Background to and practical training on orally presenting at scientific meetings; background to and practical training on scientific writing</p> <p><b>Teaching objective:</b> Participants have acquired the skills to analyse scientific content, to write it up following scientific rules and to present it to a scientific audience. Participants know the ethical norms and rules of good scientific practice,</p>

			have critically reflected on these and they are able to apply them correctly
<b>Total Optional</b>		<b>20</b>	
<b>Thesis</b>		<b>25</b>	
<b>Total 2nd year</b>		<b>60</b>	
<b>Grand total</b>		<b>120</b>	

3<sup>rd</sup> year – Trento

Curriculum title: Mountain Areas Landscape Planning and Design LM 3

Materia – Fach	Settore scientifico Wissenschaftlicher Bereich	CFU KP	Content and teaching objective
Landscape architecture C: Landscape planning and design	ICAR/15 (UNITN)	9	<p><b>Content:</b> Planning and design as complementary approaches to integrate biodiversity and land use. Both planning and design applications are prepared through workshop activities and excursions.</p> <p><b>Teaching objective:</b> Considering a selected alpine area on a different scale students are required to plan and design facing landscape problems.</p>
Landscape, Urban Design & Context	ICAR/21 (Scaglione/UNITN)	9	<p><b>Content:</b> Landscape, Urban Design, Context, concepts and methods. Definition of the processes of transformation, theory and techniques of modes of operation to integrate the landscape into the domain of urbanism.</p> <p><b>Teaching objective:</b> To understand and apply concept and methods of Landscape and Urbanism</p>
Representation techniques: Parametric design	ICAR/17 – 21 (UNITN)	9	<p><b>Content:</b> Application of parametric design (inclusion of parametric data embedded within 3D objects) to landscape design and planning.</p> <p><b>Teaching objective:</b> To understand and put into practice parametric and generative methods of design .</p>
<b>Totale /summe</b>		<b>27</b>	
Optional courses		<b>18</b>	
Infrastructure design in the contemporary landscape	ICAR/21 (UNITN)	6	<p><b>Content:</b> The design of infrastructure as formative element of the contemporary landscape. Inventory of practices and approaches, design tools and applications.</p> <p><b>Teaching objective:</b> Students are required to understand</p>

			problems affecting interactions between infrastructures and landscape and to be able to solve them in practice.
Technology and design of natural building materials	ICAR/10 (UNITN)	6	<b>Content:</b> Environmentally responsible building design. Natural building materials and methods, alternative energy technologies, sustainable building codes. <b>Teaching objective:</b> Students are required to design a building adopting an environmental responsible approach.
Geomorphology (Fluvial processes and landform)	ICAR/04	6	<b>Content:</b> Tectonics and regional structure; glacial processes and landforms; fluvial sequences, fluvial processes and landforms. <b>Teaching objective:</b> To understand natural processes to be able to integrate them with design and planning solutions.
Other activities			
Thesis		15	
<b>Totale /summe</b>		<b>120</b>	