



# Curriculum

for the Master's Programme in

# Natural Resources Management and Ecological Engineering (NARMEE)

Programme classification no.: 066 416

Effective Date: 1.10.2015



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## § 1 QUALIFICATION PROFILE

### **General objectives**

The Master of Natural Resource Management and Ecological Engineering (NARMEE) is a two year master's programme in the areas of sustainable planning, design and management of natural resources, landscapes, environmental management, business for sustainability, and ecological engineering. This international master's programme is jointly offered in English language by the Lincoln University in Canterbury, New Zealand, the Czech University of Life Sciences Prague, and the University of Natural Resources and Life Sciences, Vienna (BOKU). The programme intends to qualify the graduates for an international career in the fields of resource management and ecological engineering through studies at two universities with similar profile but different focus in teaching and research.

This interdisciplinary master curriculum encompasses the fields Civil Engineering, Mountain Risk Engineering, Forestry, Environmental and (Bio-)resource Management, supplemented by contributions from jurisprudence, social and economic sciences.

### **Professional qualifications**

Graduates of the *International Master in Natural Resources Management and Ecological Engineering* will qualify for the sustainable management of the environment by integrating technical, economic, ecological, social and cultural aspects.

### **Profile**

Natural Resources Management and Ecological Engineering require strong interdisciplinary and integrative competences, leadership, social and (foreign) language skills.

### **Specific learning objectives**

The curriculum consists of three modules as detailed in § 3. During their education students will obtain information about the international context and relevant natural processes for environmental management and engineering with specializations in risk management, ecological engineering, nature conservation and wildlife management, international business and sustainability.

### **Professional fields**

The graduates of this master curriculum will qualify for employments in general management and administration related to international affairs, such as international public or private organisations (e.g. European Commission, FAO, technical and administrative consulting companies involved in development cooperation) or at national level (civil engineering and consulting companies, quality management, research and teaching).

## § 2 ADMISSION REQUIREMENTS

Admission to the *International Master in Natural Resources Management and Ecological Engineering* will be granted to graduates of Austrian bachelor curricula of related disciplines and equivalent studies outside Austria. Explicit admission requirements are provided by the programme advisors ("Programmbegleiter") and the registration office (Studienabteilung).

For graduates of the bachelor's programme(s) offered by BOKU University of Natural Resources and Life Sciences, Vienna the specific requirements are explicitly listed in the online information sheet of the registration office.

English language skills as required for successful study completion have to be proven: Knowledge of English at level B2 (Common European Framework of Reference for Languages) is required.

## § 3 PROGRAMME STRUCTURE

### 3a) Duration, total ECTS credits, and structure

The *International Master in Natural Resources Management and Ecological Engineering* offers a jointly-awarded degree in cooperation with Lincoln University, New Zealand and the Czech University of Life Sciences Prague.

The two years (four terms) programme requires a workload of 120 ECTS including the master's thesis.

The language of instruction is English.

The programme consists of three modules with related abbreviations:

- **Ecological Engineering and Risk Management (EERM)**
- **Nature Conservation and Wildlife Management (NCWM)**
- **Economic and Social Sustainability in Natural Resources Management (ESS)**

The curriculum structure is shown in the Table 1.

After completing the second term, students are required to specialize in topics related to their master's thesis (18 ECTS). In addition, a Master's Thesis Seminar (2 ECTS) and free electives (10 ECTS) have to be passed. A master's thesis work accounting for 30 ECTS is scheduled during the 3<sup>rd</sup> or 4<sup>th</sup> term of the curriculum.

**Table 1:** Structure of the programme

	<b>Term</b>	<b>ECTS (120)</b>	<i>International Master in Natural Resources Management and Ecological Engineering</i>
<b>Subjects</b>	<b>1</b>	6	Introduction and Case Studies (6 ECTS)
		27	Basic Studies in EERM, NCWM, ESS (27 ECTS)
	<b>2</b>	27	General Skills / Research Methods in EERM, NCWM, ESS (27 ECTS)
<b>Thesis and related Subjects</b>	<b>3</b>	30	Specialization related to Thesis (18 ECTS)
			Free Electives (10 ECTS)
			Master's Thesis Seminar (2 ECTS)
	<b>4</b>	30	Thesis (30 ECTS)

### 3b) Three-pillar principle

The three-pillar principle is the central identifying characteristics of both the bachelor's and master's programmes offered at the University of Natural Resources and Life Sciences, Vienna. In the BOKU courses of the master's programmes, the sum of the compulsory and elective courses must be made up of at least

15% technology and engineering

15% natural sciences

15% economic and social sciences, law

The master's thesis, compulsory internship and free electives are excluded from the three-pillar rule.

## § 4 COURSES

### Compulsory Courses

The following courses from the subjects

1. **Introduction and Case Studies** and
2. **Master's Thesis Seminar**, offer a total of **8 ECTS**.

<i>Lecture</i>	Type	ECTS
<b><i>Introduction and Case Studies</i></b>		
Introduction in Natural Resources Management and Ecological Engineering	VO	3.0
Case Studies in Sanitary Engineering	SE	3.0
<b><i>Master's Thesis Seminar</i></b>		
Master's Thesis Seminar	SE	2.0

**Basic Studies** offers a total of 45 ECTS of which **27 ECTS** have to be chosen as compulsory courses:

<b><i>Basic Studies (a minimum of 27 ECTS has to be chosen )</i></b>		
<i>Lecture</i>	Type	ECTS
<b><i>ECOLOGICAL ENGINEERING and RISK MANAGEMENT (9 ECTS to be chosen)</i></b>		
Lecture Series in Soil, Water and Atmosphere	VO	3.0
Remote Sensing and GIS in Natural Resource Management	VO	3.0
Remote Sensing and GIS in Natural Resource Management	UE	3.0
Project Management	VU	3.0
<b><i>NATURE CONSERVATION and WILDLIFE MANAGEMENT (9 ECTS to be chosen)</i></b>		
Assessing Diversity in Forest Stands	VW	3.0
Water Resources Planning and Management	VO	3.0
Integrated Flood Risk Management	VO	3.0
<b><i>ECONOMIC and SOCIAL SUSTAINABILITY in NATURAL RESOURCES MANAGEMENT (9 ECTS to be chosen)</i></b>		
Resource and Environmental Economics	VO	3.0
Principles of Commodity Markets and Trade Policy	VO	3.0
Managerial Economics	VU	3.0
Institutions and Policies of the EU ( <i>Introduction to the Law and Politics of the European Union</i> )	VO	3.0
Regional Economics and Regional Governance	VO	3.0
Globalisation and Rural Development	VO	3.0
Development Innovation (in Eng.)	VS	3.0

## Elective Courses

From the three listed subjects **Ecological Engineering and Risk Management, Natural Conservation and Wildlife Management and Economic and Social Sustainability in Natural Resources Management** a minimum of **27 ECTS** has to be chosen from **1. General Skills / Research Methods**, and a minimum of **18 ECTS** has to be chosen from **2. Specialization**:

<i>Lecture</i>	<i>Type</i>	<i>ECTS</i>
<b>1. General Skills / Research Methods (a minimum of 27 ECTS has to be chosen)</b>		
<b>ECOLOGICAL ENGINEERING and RISK MANAGEMENT (at least 6 ECTS to be chosen)</b>		
Environmental Chemistry	SE	4.5
Biology, Chemistry and Microbiology for Civil Engineering	VU	3.0
Possible Impacts of Climate Change on Water Resources	VO	3.0
Ecologically Oriented Methods and Monitoring in River Engineering	VU	3.0
Soil Properties and Processes for Ecological Engineering	VU	3.0
Mountain Hazard Processes	VS	4.5
<b>NATURE CONSERVATION and WILDLIFE MANAGEMENT (at least 6 ECTS to be chosen)</b>		
Environmental Chemistry**	SE	4.5
Biology, Chemistry and Microbiology for Civil Engineering	VU	3.0
Plant Populations and Conservation Genetics (in Eng.)	VU	1.0
Formulation of questions and experimental design in ecological research	VS	4.5
Multiple Criteria Decision Making in Natural Resource Management	VS	3.0
Protection of Natural Resources by Organic Farming**	VS	3.0
Soil- Bioengineering Techniques (Slopes & Gullies)	VS	3.0
<b>ECONOMIC and SOCIAL SUSTAINABILITY in NATURAL RESOURCES MANAGEMENT (at least 6 ECTS to be chosen)</b>		
Principles of Empirical Research Methods in the Social Sciences	VS	3.0
Valuation Methods for Natural Resources	VO	3.0
Technology Assessment	VS	3.0
Decision Making in Management with Special Emphasis on Cultural Differences**	VO	3.0
Game Theory in Environmental and Natural Resource Management	VO	3.0
Applied Mathematical Programming in Natural Resource Management	VS	3.0
Computer Simulation in Energy and Resource Economics	VS	3.0

\*\* The course is offered only every two years.

<b>Lecture</b>	<b>Type</b>	<b>ECTS</b>
<b>2. Specialization (a minimum of 18 ECTS has to be chosen)</b>		
<b>ECOLOGICAL ENGINEERING and RISK MANAGEMENT</b>		
Planning and Design in Water Supply and Wastewater Treatment	UE	3.0
Global Waste Management II	VO	3.0
Ecology and Management of the Rhizosphere in Ecological Engineering	UE	4.5
Sediment Regime and River Morphology	VO	3.0
Physical and Selected Chemical Methods of Soil Analysis	PR	4.5
Simulation in Vadose Zone Environment	VU	3.0
In-situ Treatment of Polluted Soils and Sediments: Phytoremediation, In-situ Fixation and Attenuation Techniques	UE	4.5
Water Resources Management in Developing Co-operation	VU	3.0
Modelling in Sanitary Engineering (Sewer, Treatment Plant and Receiver)	VU	4.5
On Site Solutions for Water Supply and Sanitation	VO	3.0
Industrial Water Management	VO	3.0
Computer Based River Modelling	VU	3.0
Global Design Studio	PJ	6.0
Protection and Mitigation Measures against Natural Hazards	VX	3.0
Risk Management and Vulnerability Assessment	VS	3.0
Soil Pollution and Remediation	VU	3.0
Environmental Risk Analysis and Management	VO	3.0
Application of GIS in Hydrology and Water Management	VO	3.0
<b>NATURE CONSERVATION and WILDLIFE MANAGEMENT</b>		
Protection and Mitigation Measures against Natural Hazards	VX	3.0
Soil Erosion Models and their Application	VU	4.5
Soil Conservation and Soil Protection	VU	3.0
Ecology of aquatic plants	VU	2.0
Scientific Writing	SE	1.5
Conservation Biogeography and Genetics	VS	3.0
Biocultural Diversity in Rural Landscapes	VS	3.0
Modelling of Mountain Forest Ecosystems	VS	2.5
Fire Management in Mountain Forest Ecosystems	VS	2.0

Innovations for Sustainable Forest Management	VS	4.0
Role of Soils in Nature Conservation and Wildlife Management	VU	1.5
<b><i>ECONOMIC and SOCIAL SUSTAINABILITY in NATURAL RESOURCES MANAGEMENT</i></b>		
Growth, Development, Trade and Environment (in Eng.)**	VO	3.0
Mountain Forest Policy	SE	4.5
Innovations for Sustainable Forest Management	VS	4.0
Global Networking	SE	6.0
Participatory methods in development research and practice	SE	3.0
Facilitating change for sustainable development (in Eng.)	VS	3.0
Negotiating change: simulating an international conference for sustainable development (in Eng.)	VS	3.0

\*\* The course is offered only every two years.

## § 5 MASTER'S THESIS

- (1) Successful completion of the master's thesis is mandatory for completion of the *International Master in Natural Resource Management and Ecological Engineering*. According to the international character of the curriculum, the thesis has to be prepared in English.
- (2) The topic of the master's thesis must be related to one of the subjects of the *International Master in Natural Resources Management and Ecological Engineering*.
- (3) The supervision of the thesis is vested with the university teacher who proposed the topic.
- (4) A second co-supervisor of the thesis work is required from the partner university.
- (5) The master's thesis must be submitted to the Dean of Studies.
- (6) The master's thesis is granted with 30 ECTS.

## § 6 COMPLETION OF THE MASTER'S PROGRAMME

The master's programme in *Natural Resources Management and Ecological Engineering* has been completed when the student has passed all required courses and received a positive grade on the master's thesis and defense.

## § 7 ACADEMIC DEGREE

The graduates of the master's programme in *Natural Resources Management and Ecological Engineering* will receive a joint degree „Master of Science“, abbreviated „MSc“, from the University of Natural Resources and Life Sciences, Vienna, issued jointly with either the Czech University of Life Sciences Prague or Lincoln University, New Zealand. The Joint Degree will be issued by that university where the studies had been started („home university“).

The academic degree MSc, if used, shall follow the bearer's name (§ 88 [2] UG 2002 BGBl. I no. 81/2009).

## § 8 EXAMINATION REGULATIONS

Successful completion of the master's programme in *Natural Resources Management and Ecological Engineering* requires:

- successful completion of the compulsory courses listed in § 4 integrating Introduction and Case Studies (6 ECTS), Basic Studies (27 ECTS), General Skills/Research Methods (27 ECTS)
- successful completion of the courses at the partner university integrating specialization (18 ECTS), Elective Field of Concentration (10 ECTS) and Master's Thesis Seminar (2 ECTS)
- a positive grade on the master's thesis and the defensio.

The topic of the master's thesis shall be selected from one of the subjects of the master's programme.

After the successful completion of all the courses and examinations required in the master's programme, the completed master's thesis, after it has been given a positive evaluation by the thesis supervisors, shall be publically presented by the student and defended in the form of an academic discussion (defensio). The committee shall consist of a committee chair and two additional university teachers with a *venia docendi* or equivalent qualification. The student's total performance (thesis and defensio) will be assigned a comprehensive grade. Both thesis and defensio must receive a passing grade for the student to complete the programme.

The thesis grade and the defensio grade are included in calculating the comprehensive grade and are documented separately. The comprehensive grade is calculated as follows:

- Master's thesis: 70%
- Defensio (incl. presentation): 30%

A comprehensive evaluation of the student's performance in the entire programme shall be assigned. A comprehensive evaluation of "passed" means that each individual component of the programme was completed successfully. If individual components of the programme have not been successfully completed, the comprehensive evaluation is "failed". A comprehensive evaluation of "passed with honours" is granted if the student has received no grade worse than a 2 (good) on all individual components, and if at least 50% of the individual components were graded with 1 (excellent). Students additionally need to fulfill the distinction criteria of the partner universities.

## § 9 COURSES OFFERED AT PARTNER UNIVERSITIES

### (1) Lincoln University, New Zealand

#### **Election of courses at Lincoln University:**

Students have to elect courses from the Master Degree Subjects (all 600 Level) appropriate for their specialization in agreement with their mentor at Lincoln University, either ERST 631 (Environmental Sciences in Environmental Policy) or ERST 636 (Aspects of Sustainability in an International Perspective) are compulsory.

#### **Recommended courses for the specializations:**

##### **1. Ecological Engineering and Risk Management**

Courses which begin with the abbreviations ECOL, ENGN, ERST, MICR, PHSC, PLPT, SOCI, SOSC or TRAN.

##### **2. Nature Conservation and Wildlife Management**

Courses which begin with the abbreviations ECOL, ERST or PLPT.

##### **3. Economic and Social Sustainability in Natural Resources Management (ESS)**

Courses which begin with the abbreviations ECON, ERST, BMGT or SOCI.

## **(2) Czech University of Life Sciences Prague**

### **Election of courses at the Czech University of Life Sciences Prague:**

Students have to elect courses from the Master Degree Subjects (all 600 Level) appropriate for their specialization in agreement with your mentor at the Czech University of Life Sciences Prague:

A total of 40 ECTS at this partner university is required for NARMEE students from BOKU to obtain the double degree at CULS, consisting of:

- 30 ECTS elected from the list of courses of the MSc Natural Resources and Environment (NRE); part of the required ECTS can be obtained for a NRE master's thesis (e.g., 10 ECTS for a NRE master's thesis and 20 ECTS from the other course offers of NRE) AND
- 10 ECTS freely elected from the entire course programme offered in English language at the Czech University of Life Sciences Prague (especially from the master programmes MSc Agricultural Economics and Management, MSc Technology and Environmental Engineering, Msc Forestry, Water and Landscape Management as well as MSc Informatics).

If a student can demonstrate sufficient knowledge in a certain field, this subject may be exchanged for other subjects if the mentors of both universities agree (e.g., students with excellent knowledge in soil physics may exchange this subject with other courses if the mentors agree).

## **§ 10 STUDY FEES AT LINCOLN UNIVERSITY, NEW ZEALAND**

If the negotiated exchange quota of students is exceeded, Lincoln University is entitled to charge a study fee. Additional fees can be charged if the period of stay of 1 semester is exceeded. Information on this issue and on funding possibilities can be given by the BOKU Center for International Relations (ZIB).

## **§ 11 TRANSITIONAL PROVISIONS**

For students continuing their studies under the provisions of the previously valid curriculum, the list of equivalent courses (Äquivalenzliste) pursuant to a resolution of the Academic Programme Committee (Studienkommission) applies. This list includes all courses that correspond to courses offered in the previously valid curriculum.

For students who switch to the new master's programme curriculum, examinations for courses taken under the provisions of the previously valid curriculum shall be recognized towards the new programme under the provisions of this curriculum based on the list of equivalent courses.

## **§ 12 EFFECT**

This curriculum shall take effect on 1.10.2015.

## **ANNEX A TYPES OF COURSES**

The following types of courses are available:

### **Lecture (VO)**

Lectures are courses in which certain areas of a subject and the methods used in this area are imparted through didactic presentation.

### **Exercise course (UE)**

Exercise courses are courses in which students are instructed in specific practical skills, based on theoretical knowledge.

### **Practical course (PR)**

Practical courses are classes in which students deal with specific topics independently, based on previously acquired theoretical and practical knowledge.

### **Compulsory internship seminar (PP)**

The compulsory internship seminar is a class in which students deal independently with topics related to their internship placements, based on previously acquired theoretical and practical knowledge.

### **Seminar (SE)**

Seminars are courses in which students are required to work independently on the respective subject, deepen their knowledge of the topic and discuss relevant issues.

### **Field trips (EX)**

Field trips are courses in which students have the opportunity to experience relevant fields of study in real-life practical application, to deepen their knowledge of the respective subject. Field trips can be taken to destinations both in Austria and abroad.

### **Master's thesis seminar (MA)**

Master's thesis seminars are seminars intended to provide students with academic support during the thesis writing process.

### ***Mixed-type courses:***

Mixed-type courses combine the characteristics of the courses named above (with the exception of project-type courses). Integration of different course-type elements improved the didactic value of these courses.

### **Lecture and seminar (VS)**

### **Lecture and exercise (VU) Lecture and field trip (VX)**

### **Project course (PJ)**

Project courses are characterized by problem-based learning. Under instruction, students work - preferably in small groups - on case studies, applying appropriate scientific methods.

### **Seminar and field trip (SX)**

### **Exercise and seminar (US)**

### **Exercise and field trip (UX)**