

Universität für Bodenkultur Wien
BOKU University, Vienna

Curriculum

for the Master Programme in

Material and Energetic Exploitation of Renewable Raw Materials (NAWARO)

and the International Master Programme

Biomass Technology

Programme classification no. 066 471

Effective date: October 1st, 2025

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Curriculum of the International Master Programme
“Material and Energetic Exploitation of Renewable Raw Materials (NAWARO)”
At the University of Natural Resources and Life Sciences, Vienna

As at October 1st, 2025

The study programme at hand is concerned with the **Master programme “Material and Energetic Exploitation of Renewable Raw Materials (NAWARO)” at the University of Natural Resources and Life Sciences, Vienna (BOKU) (Alternative A)** as well as the **international study programme “Biomass Technology”, a joint degree programme that is offered in cooperation with the Technical University Munich (TUM) (Alternative B)**. In this document, both study programmes are referred to in the singular to allow for simplification.

§1 QUALIFICATION PROFILE

The Master programme in “Material and Energetic Exploitation of Renewable Raw Materials (NAWARO)”/ “Biomass Technology”, is a degree programme which serves to deepen and extend students’ pre-vocational academic education, building on the basis provided by a Bachelor degree programme (§ 51 [2] item 5 of the Universities Act UG 2002, Federal Law Gazette BGBl I no. 81/2009). The programme fulfils the requirements of Directive 2005/36/EC on the recognition of professional qualifications, article 11, letter e.

1a) Knowledge and Personal and Professional Skills

The graduates of the Master programme “Material and Energetic Exploitation of Renewable Raw Materials (NAWARO)”/ “Biomass Technology”, are equipped with competences in the fields of natural sciences, engineering sciences and socioeconomics that are requested for the development of interdisciplinary solutions in science, as well as in a municipal, operational and social environment. The graduates are enabled to understand, analyse and practically realize complex problems in the fields of material and energetic utilisation of renewable resources – making use of subject-specific and interdisciplinary methods. Doing so, graduates access their skills and competences gained in the various technically, natural scientifically and socioeconomically oriented courses. The competences of graduates range from primary materials production and exploitation respectively, all the way to their uses. The utilisation of renewable resources as food product or animal feed is regarded as a subject area that lies outside this Master programme.

The international Master programme “Biomass Technology” (**Alternative B**) is based on a cooperation between the University of Natural Resources and Life Sciences, Vienna (BOKU) and the Technical University Munich (TUM), the latter having a university location at Strobing which puts an emphasis on “Renewable Recourses”.

Knowledge, Skills and Competences from the Compulsory Courses:

Due to the offered compulsory courses, all graduates of this Master programme are equipped with the necessary knowledge and skills in the fields of raw materials production, raw material conversion and utilisation, socioeconomics and ecology and environment.

Knowledge, Skills and Competences from the Elective Courses:

Thanks to the individual choice and the composition of special courses taken from the contingent of the elective subject courses respectively, the graduates of this Master programme acquire specific subject-related and social competences. Possibilities for in-depth studies are offered in the fields of Production of Renewable Raw Materials, Process Engineering of Renewable Raw Materials, Raw Materials and Technology, Raw and Basic Material Characterization, Biorefinery, Energetic Utilisation of Renewable Resources, Business Management, Logistics and Marketing, Politics, Ecology and Environment as well as specific scientific methods.

1b) Professional Qualifications

Due to the interdisciplinary orientation of the Master programme “Material and Energetic Exploitation of Renewable Raw Materials (NAWARO)"/ “Biomass Technology”, a broad range of occupational areas and fields of activities are open for graduates based on the chosen subject-specific in-depth modules.

The Master programme is aimed at vocational preparation for the exercise of management and executive functions in businesses and public institutions, in the field of material and energetic utilisation of renewable resources. The fields of activities of graduates of the Master programme comprise of the following exemplified areas:

- Development, production and utilisation of biogenic raw materials on the basis of renewable resources
- Economic implementation of products from renewable resources (raw materials, materials, energy)
- Research and development in the field of energy and process engineering, in the field of environmental engineering, in the field of the development of innovative biobased raw materials
- Operational activities in the field of environmental and resource economy and environmental ethics
- Project- and investment management
- Quality management, quality- and knowledge management
- Freelance engineering company and consulting engineers respectively, business consultancy
- Civil engineering
- Authorised expert in the fields of resource use and environmental technology
- Environmental consulting for local authorities, businesses, action groups, etc.
- Engineering departments (for example facility design and plant layout, environmental measures)
- Activities in lobbies, national environmental associations and co-operatives
- Activities in national and international organizations and lobbies
- Activities in environmental, energy and regional development agencies
- Activities in secondary education
- Activities in administration on EU-, national, state, district and municipal level
- Activities in non-governmental organizations

§ 2 ADMISSION REQUIREMENTS

Graduates of the Bachelor programme Wood and Fibre Technology (H 226) offered by BOKU University of Natural Resources and Life Sciences, Vienna, are eligible for admission with no further requirements, for those of the Bachelor programmes in Agricultural Sciences (H 255), Forestry (H 225), Wood and Fibre Technology (H 226), Food Science and Biotechnology (H 217) as well as Environment and Bio Resources Management (H 227) mastery of the core subjects of process engineering is required for admission. Furthermore, graduates of professionally equivalent Bachelor programmes of *accredited* national or international universities are eligible for admission.

For graduates of other Bachelor programmes completed at other universities, mastery of the following learning outcomes is required for admission:

- (1) Knowledge in basic areas of natural and social sciences:
Mathematics, statistics, physics, chemistry, botany, ecology, material science, business economics, economics.
- (2) Knowledge in field-related core areas:
Core subjects of technology and engineering (process engineering, process technology, mechanical engineering, industrial processes, development and processing, energy management, construction engineering, or similar subjects)

If a certificate of a total of at least 30 completed ECTS points for each of the two subject areas can be provided, admission to the programme can be granted. Furthermore, competences in English at a level of B2 (according to the Common European Framework of Reference for Languages by the Council of Europe) are recommended.

For those students who choose the international study programme “Biomass Technology”, (**Alternative B**), the assessment of admission requirements is carried out by the eligibility test established at the Technical University of Munich (TUM). Admission by the Technical University of Munich (TUM) is recognized by the University of Natural Resources and Life Sciences, Vienna (BOKU).

§ 3 PROGRAMME STRUCTURE

3a) Duration, Total ECTS Credits and Structure

The study programme consists of courses and other requirements worth a total of 120 ECTS credits. This is equivalent to a duration of four semesters. The programme is divided into

Compulsory courses:	32 ECTS credits
Master's Thesis:	30 ECTS credits
Elective courses:	46 ECTS credits
Free electives:	12 ECTS credits

Students are required to complete courses, which are related to the field of study, worth a total of 10 ECTS credits taught in a foreign language (usually in English). These courses can be compulsory courses, elective courses, internships or free electives. Courses taken at international universities abroad are to be credited. General language courses (with the exception of language courses specialised for science and technology but not German for Science) will not be considered. (General foreign language courses may be credited in the framework of free elective courses.)

The **international study programme “Biomass Technology” (Alternative B)** is a joint degree study programme that is offered in cooperation with the Technical University Munich (TUM). Students of the international study programme may freely choose their place of study but must successfully complete at least one semester at the partner institution:

<p>1st Semester</p> <p>Study site: Home university (= BOKU or TUM)</p>	<p>2nd Semester</p> <p>Study site: can be freely selected from both partner universities (= BOKU or TUM)</p>	<p>3rd Semester</p> <p>Study site: can be freely selected from both partner universities (= BOKU or TUM)</p>	<p>4th Semester</p> <p>Study site: can be freely selected from both partner universities (= BOKU or TUM)</p>
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3b) Three-Pillar Principle

The three-pillar principle is one of the central identifying characteristics of both the Bachelor and Master programmes offered at the University of Natural Resources and Life Sciences, Vienna. In the Master 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.

3c) Limited Number of Participants in Courses

For courses with a limited number of participants the head of the Master course is authorised to first admit students enrolled in the Master programme (that means that students enrolled in a Bachelor programme can only be admitted to the courses if further spaces are left on the course!). The admission of students enrolled in the Master programme is conducted according to the following order of required courses by the students: compulsory course, elective course, free elective course.

§4 COMPULSORY COURSES

Used Abbreviations:

ECTS = European Credit Transfer System

WS = Winter Semester

SS = Summer Semester

Notes:

- 1) In English
- 2) In English and German
- 3) Courses not offered in the academic year 2024/25
- 4) Courses only offered in uneven years (e.g. 2021/22, 2023/24)
- 5) Courses only offered in even years (e.g. 2022/23, 2024/25)

The Master programme consists of compulsory courses worth a total of 32 ECTS credits, as listed in the table below.

In the international Study Programme "Biomass Technology" (Alternative B), compulsory courses can be completed either at the Technical University of Munich, Campus Straubing, or at the University of Natural Resources and Life Sciences, Vienna. For details, please check Annex B.

Course Title	Course Type	ECTS Credits
Thematic block Introduction to renewables utilisation		
Post-harvest technology ¹	VX	2
Chemistry and technology of sustainable resources ¹	VO	2
Technology of wood processing	VO	1
Thematic block Introduction to energy conversion and energy economics		
Energy economics and policy	VS	3
Biorefinery and products from renewable resources ¹	VO	2
Thematic block Introduction to economics of renewable resources		
Computer simulation in energy and resource economics ¹	VS	3
Modelling of techno-economical processes	VU	2
Thematic block Renewable resources and agro-ecosystems		
Silvicultural strategies for secondary conifer forests	VS	2
Regeneration resources I	VO	4
Thematic block Life cycle assessment of renewable resources		
Life cycle assessment of renewable resources	VU	4
Thematic block Renewable resources and nature protection		
Integrated landscape management and nature conservation	VS	5
Thematic block Master's thesis seminar		
Master's thesis seminar	SE	2

§ 5 ELECTIVE COURSES

Elective courses worth a total of 46 ECTS credits are required to complete the Master programme. If at least 30 ECTS of one of the four focus areas – “Renewable Raw Materials and Cultivation Systems”, “Chemical and Material use of Biomass”, “Energetic Use of Biomass” and “Economics of Renewable Resources” – have been chosen, this focus area will be mentioned in the graduation documents.

Course Title	Course Type	ECTS Credits
Thematic block Specific farming of renewable raw materials		
Field crop production and products	VS	4
Technology manure utilisation	VU	3
Thematic block Ecophysiology of farming plants		
Plant and environment ¹	VO	3
Thematic block Soil protection in agriculture		
Soil protection ¹	VO	3
Thematic block Forest ecosystem management		
Mountain forest silviculture	VO	2
Forest soil biology ¹	VU	3
Aspects of nature conservation in forest protection ³	VO	1
Thematic block Medical and spice plants		
Aspects of product quality in plant production ¹	VX	4
Medicinal and aromatic plants ¹	VO	3
Thematic block Analysis of short rotation coppices		
Supply of wood fuels	VS	3
Actual and future-oriented themes of silviculture	VX	2
Thematic block Agricultural engineering in plant production		
Agricultural engineering in plant production - seminar ¹	SX	4
Focus area 2: Chemical and Material use of Biomass	Course Type	ECTS Credits
Course Title		
Thematic block Biogenic polymers		
Bionics - technical solutions from nature	VO	2
Separation processes for renewable resources	VO	2
Biobased and biodegradable plastics ¹	VO	2
Thematic block Utilisation of timber as material		
Wood and fibre quality ¹	VO	2
Natural-fibre raw materials	VO	2
Thematic block Chemical engineering		
Chemistry and technology of polymers	VO	2
Chemicals from biomass	VO	2
Thematic block Enzyme technology		
Processes in enzyme technology ¹	VO	2

Biochemical technology ¹	VO	2
Wood - biotechnology	VS	2
Thematic block Industrial microbiology		
Technology and properties of natural raw materials	PR	4
Microbiology	VO	2
Thematic block Process technology		
Mechanical and thermal process technology II ^{1,3}	VU	3
Wood-industrial processes: wood- and fibre-based materials ¹	VO	2
Thematic block Technology fiber- and wood materials		
Engineered wood products ¹	VO	2
Composite ¹	VO	2
Wood and fibre material performance	VU	2
Thematic block utilisation of timber as material II		
Wood cutting, milling, moulding	VO	2
Technology of wood processing	UE	2
Focus area 3: Energetic Use of Biomass	Course Type	ECTS Credits
Course Title		
Thematic block Electrical engineering & distribution		
Energy engineering ¹	VO	3
Electro-energy-technics	VO	3
Thematic block Energetic use of biomass		
Energy economics	VO	3
Renewable energy resources ¹	VX	3
Thematic block Energy and process engineering		
Applied measurement and control systems ¹	VU	3
Practical course in energy engineering ¹	PR	3
Thematic block Balancing and design of energy engineering		
Integrated spatial and energy planning	VS	3
Future energy supply in dependence of resource availability	SE	3
Thematic block Biogastechnology		
Biogenic solid and liquid fuels	VO	2
Biogas technology	VU	3
Thematic block Research practical "Energetic use of renewable resources"		
Seminar on energy economics	SE	3
Focus area 4: Economics of Renewable Resources	Course Type	ECTS Credits
Course Title		
Thematic block Marketing for renewable resources		
Market research and market analysis	VU	3
Innovation processes in the forest-based bioeconomy ¹	SE	2
Thematic block Cost-accounting and controlling		
Environmental economics at company level	VO	3
Farm business management I	VO	3
Thematic block Environmental and natural resource		

economics		
Resource and environmental economics ¹	VO	3
Economic of sustainable land use under global change	VO	3
Thematic block Logistics I		
Logistic systems	VS	6
Thematic block Logistics II		
Business management I	VU	3
Logistics in forestry and timber industry	US	3
Procurement	VO	1
Thematic block Survey research		
Survey research in the social sciences	SE	3
Principles of qualitative approaches in the social sciences	VS	3
Focus area 5: Environment and Ecology	Course Type	ECTS Credits
Course Title		
Thematic block Material Flow management		
Waste technology	VO	3
Thematic block Environmental law and technology in the timber industry sector		
Plant and environment technology	VS	2
Environmental law	VO	3
Thematic block Quality assessment of water and waste water		
Water quality assessment	VU	4.5
Thematic block Environment and ecology		
Ecology	VO	3
Crop production systems in organic agriculture ¹	VU	3
Thematic block Global change		
Global change ecology	VO	3
Climate change and forest management ^{1, 3}	VS	2
Focus area 6: Methods	Course Type	ECTS Credits
Course Title		
Thematic block Applied statistics		
Research design ¹	VU	2
Experimental design	VO	3

For students who are enrolled in the **international study programme “Biomass Technology” (Alternative B)** in cooperation with the **Technical University Munich (TUM)**, the prior examination regulations and study guidelines for the joined Master programme ‘Biomass Technology’ are those of the Technical University of Munich (TUM). An overview of equivalent courses at TUM and BOKU is provided by the joint study programme coordinators.

§ 6 FREE ELECTIVES

Free electives worth a total of 12 ECTS credits are required to complete the Master programme. Free electives may be selected from all courses offered by all recognized universities in Austria and abroad. Free electives are intended to impart knowledge and skills in the student's own academic subject as well as in fields of general interest.

It is recommended to choose the free elective courses from the elective courses offered in § 5 and from the list of recommended free electives.

§ 7 MASTER'S THESIS

A Master's Thesis is a paper on a scientific topic, to be written as part of the Master programme Material and Energetic Exploitation of Renewable Raw Materials (NAWARO) (for exceptions please see the By Laws of the University of Natural Resources and Life Sciences, Vienna, part III- Teaching, § 30 [9]). The thesis is worth a total of 30 ECTS credits. With their Master's Thesis, students demonstrate their ability to independently address a scientific topic, both thematically and methodologically (§ 51 [8] UG 2002 BGBl. I no. 81/2009).

The topic of a Master's Thesis shall be chosen in such a way that it relates to a field of the curriculum and that it is reasonable to expect a student to be able to complete it within six months. Multiple students may jointly address a topic, provided that the performance of individual students can be assessed (§ 81 [2] UG 2002 BGBl. I no. 81/2009).

The Master's Thesis shall be written in German or English. Languages other than German or English are permissible only if approved and confirmed by the thesis supervisor. The thesis defence must be held in German or English regardless of the language of the thesis.

For students of the international study programme "Biomass Technology" (**Alternative B**), the supervision of the Master's Thesis is taken care of by a university instructor of BOKU/ of the partner university who has a teaching license (these are associate professors and professors), as well as the alternating co-supervision of BOKU and TUM respectively. In accordance with the regulations at BOKU and TUM co-supervision may also be carried out by an associated university instructor. For this, 10 ECTS are granted as work performed at the partner university.

§ 8 COMPLETION OF THE MASTER PROGRAMME

(1) When enrolled in the Master programme Material and Energetic Exploitation of Renewable Raw Materials (NAWARO) at the University of Natural Resources and Life Sciences, Vienna (**Alternative A**), this study programme is finished when the student has passed all required courses and received a positive grade on the Master's Thesis and defence examination.

(2) When enrolled in the international study programme "Biomass Technology" (**Alternative B**), this study programme is finished upon the completion of the following:

a) Provision of the following requirements at the home university:

All those exams that have to be completed in the course of the Master programme according to the Qualifying Examination Regulations and the Study Regulations for the joint Master programme “Biomass Technology” at the Technical University Munich

b) Provision of the following qualifications at the partner university:

Successful completion of at least one semester at the respective partner university and co-supervision of the Master’s Thesis at the respective partner university.

The compilation of the graduation documents of the international study programme “Biomass Technology” (joint degree programme) is carried out by the examination office at the Technical University of Munich.

§9 ACADEMIC DEGREE

Graduates who completed the Master programme in Material and Energetic Exploitation of Renewable Raw Materials (NAWARO) at BOKU (**Alternative A**) are awarded the academic title Diplom-Ingenieur (m) or Diplom-Ingenieurin (f), abbreviated as Dipl.-Ing./ Dipl.-Ing.ⁱⁿ or DI/DIⁱⁿ. The academic title Dipl.-Ing./Dipl.-Ing.ⁱⁿ or DI/DIⁱⁿ, if used, shall precede the bearer’s name (§ 88 [2] UG 2002 BGBl. I no. 81/2009).

Graduates of the international study programme “Biomass Technology” (**Alternative B**) are awarded the academic title Master of Science, abbreviated as MSc. The academic title MSc, if used, shall follow the bearer’s name, (§ 88 [2] UG 2002 BGBl. I no. 81/2009).

§10 EXAMINATION REGULATIONS

(1) The Master programme in Material and Energetic Exploitation of Renewable Raw Materials (NAWARO) has been completed successfully when the following requirements (corresponds to components in [7] below) have been met:

- positive completion of compulsory courses worth a total of 32 ECTS credits (§ 4)
- positive completion of elective courses worth a total of 46 ECTS credits (§ 5)
- positive completion of free electives worth a total of 12 ECTS credits (§ 6)
- a positive grade on the Master’s Thesis (30 ECTS credits) and the defence examination

(2) Student evaluation takes the form of course examinations. Course examinations can be written and/or oral, as determined by the course instructor, taking the ECTS credit value of the course into account. Any prerequisites for admission to examinations shall be listed in § 2.

(3) The choice of examination methods shall be based on the type of course: Lectures shall conclude with a written and/or oral examination, if continuous assessment of student performance is not applied. Seminars, practicals and project-based courses (see annex) can be evaluated based on independently written papers, length and contents of which are determined by the course instructor. For all other course types, the examination type is at the instructor’s discretion.

(4) The topic of the Master's Thesis shall be selected from one of the subjects of the Master programme (compulsory or module subject). The student must inform the dean in writing prior to the commencement of the work on the Master's Thesis. Thereby, the student has to state the Master's Thesis topic as well as the name of the supervisor of the Master's Thesis.

(5) The completed Master's Thesis shall be publically presented by the student and defended in the form of an academic discussion (defence examination) after successful completion of all courses. The committee shall consist of a committee chair and two additional university lecturers with a *venia docendi* or equivalent qualification. The student's total performance (thesis and defence examination) will be assigned a comprehensive grade. Both thesis and defence examination must receive a passing grade for the student to complete the programme. The written evaluations stating the grounds for the thesis grade and the defence examination grade are included in calculating the comprehensive grade and are documented separately.

The comprehensive grade is calculated as follows:

- Master's Thesis: 70%
- Defence examination (incl. presentation): 30%

(6) A comprehensive evaluation of the student's performance on 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).

(7) For students of the **international study programme "Biomass Technology" (Alternative B)**, the examination regulations of the respective partner university have to be applied for programme achievements at that partner university.

§ 11 TRANSITIONAL PROVISIONS

Students who are subject to the Master curriculum Material and Energetic Exploitation of Renewable Raw Materials (NAWARO), (UH 066 471, curriculum version 16U) that was in action to date, are entitled to complete their study programme until November 30, 2020.

For students in the new Master's curriculum already positively completed exams on courses from the old Master's curriculum are acknowledged based on the equivalence list for the respective study programme.

§ 12 EFFECTIVE DATE

This curriculum shall take effect on October 1st, 2025.

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.

Lab Course (UE)

Lab 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.

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.

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/Seminar (VS)

Lecture/Lab (VU)

Lecture/Field Trip (VX)

Seminar/Field Trip (SX)

Lab/Seminar (US) Lab/Field

Trip (UX)