

Module code	Module name	Short description	Semester	ECTS
<b>Compulsory modules – Degree program „Supply Engineering and Environmental Engineering“</b>				
4VU-MATHE-12	Mathematics	The module aims to consolidate and expand basic mathematical skills and to enable the students to apply the acquired knowledge in an interdisciplinary manner. Focus is laid on the training of logical thinking and the acquisition of strategies to solve extensive problems. Technical processes mainly from the field of supply engineering are to be described mathematically using methods of linear algebra and analysis.	1 and 2	6
4VU-WFF-10	Materials and Production Engineering and Joining Technology	The module enables students to acquire and confidently apply fundamental knowledge of materials and manufacturing processes used in supply and environmental engineering for semi-finished products and products relevant to supply engineering. Students acquire knowledge of the properties and treatment options of materials. Moreover, test methods and their application is demonstrated using practical examples including an application-oriented material selection. In addition, basic manufacturing processes are presented with emphasis on subject-specific requirements to allow for an engineering perspective on the interrelationships between operating conditions / choice of material / manufacturing process. Finally, specialist knowledge of joining technology is conveyed using applications from supply engineering.	1	5
4VU-NATG-12	Scientific Foundations	The module enables students to acquire and confidently apply fundamental knowledge of physics, chemistry and thermodynamics and to scientifically model technical problems. Furthermore, students acquire the competence to interpret technical tasks in a scientifically correct way and to implement them in a professional engineering manner.	1 and 2	10
4VU-INFO-12	Information Technology	Complex 1 aims to familiarize students with network technology. Students gain experience in the confident handling and application of the system applications of the in-house network. Complex 2 focuses on the confident use of drawing and design software, preferably in the latest version. Students are enabled to use different applications of supply engineering, e.g. sanitary, heating, ventilation, air conditioning and refrigeration engineering, and to interpret the calculation results in a professional manner. In addition, students learn how to handle drawing output devices confidently and ready for use.	1 and 2	7
4VU-BERE-23	Business Administration/Law	Students acquire knowledge of the fundamentals of business administration and law in the field of supply and environmental engineering. They deal with the interrelationships between engineering activities and business results, taking into account social and societal aspects. They become acquainted with the necessity of goal-oriented conduct and the holistic approach.	2 and 3	7

		Students are familiarized with the structure of a company in the sector, the economic framework conditions for companies and the recording, decision-making and control mechanisms in organizational structures. Students acquire practice-relevant knowledge of legal terms of public and private law as well as operational environmental protection law and learn to grasp the planning and approval requirements of technical supply systems in terms of type and scope. They develop methodical approaches for the integration of legal requirements into the planning and for the preparation of the construction work.		
4VU-ENG-12	Foreign Language / English	<p>The module aims to deepen foreign language skills in order to improve the communicative abilities in relevant specialist areas both orally and in writing.</p> <p>The module provides a framework in which students improve their general language skills in English business communication and expand their vocabulary in subject-specific contexts.</p> <p>Students develop conversation strategies and learn to professionally present their company and themselves in the foreign language.</p> <p><b>Methodology</b></p> <p>Students read, analyze, translate and prepare technical texts. Furthermore, they study and practice relevant structures. The module imparts initial knowledge of editorial processes, practices and standards to improve writing skills. In-class lectures include a seminar project to put the learned contents into practice. Students prepare their own specialist articles and edit these draft texts. The results of this work are digitally processed in group work and presented online.</p> <p>The knowledge acquired during the seminar project is tested in the final written examination.</p>	1 and 2	5
4VU-TEME-23	Technical Mechanics	Upon completion of the module, students have acquired fundamental knowledge in the field of technical mechanics and strength of materials, and are able to apply the concepts and methods of the subject to simple load cases. Moreover, they are enabled to identify complex static problems and prepare them for further processing by structural engineers or designers.	2 and 3	6
4VU-GAT-12	Foundations of Systems Engineering	The module aims to provide the basis for designing a circuit diagram of the respective sub-sector. For this purpose, students are enabled to produce drawings and to read them properly. To achieve this competence, it is essential to know the most important plant components of the respective sub-sector in structure and function. Furthermore, the advantages and disadvantages of the components must be correctly identified in order to find the optimum solution for the respective task when designing the circuit diagram. At the same time, students are familiarized with the necessary boundary conditions that must be taken into account when installing the	1 and 2	7

		individual components in the system. The acquired knowledge and competences are to be supported and deepened in suitable laboratory exercises.		
4VU-STRÖM-23	Fluid Mechanics	The module aims to impart knowledge of the principles of fluid mechanics, the problems of hydrostatics, frictionless and friction-affected flow and their application in supply engineering. This involves creating the basis for the planning and calculation of technical supply systems. These are to be applied in the assessment of different types of pipe and sewer networks with different media.	2 and 3	5
4VU-ETGG-34	Electrical Engineering / Foundations of Building Automation	The module aims to impart the fundamentals of electrical engineering and its application in various fields of supply and environmental engineering. The fundamental principles of electrical engineering, the device-related knowledge of electrical drives and electrical protection measures are covered. In addition, students acquire knowledge of the fundamentals of measurement technology and control systems in supply and environmental engineering and learn to apply this knowledge to related problems.	3 and 4	7
4VU-PROMA-34	Project Management	The module aims to impart the fundamental principles of project management, construction site planning, construction site equipment, procurement and calculation. The findings are applied to selected case studies. Legal regulations for public and private contractors are explained. Particular attention is paid to the application of the VOB (German Construction Contract Procedures), Parts A, B, C and the HOAI (German Fee Structure for Architects and Engineers). Students are enabled to prepare service descriptions and service specifications for technical supply planning, tender preparation and execution.	3 and 4	5
4VU-GVT-34	Foundations of Supply Engineering	The module aims to impart fundamental knowledge of supply engineering and its application. Students acquire knowledge from the fields of heating, ventilation, air conditioning and sanitary engineering, deal with the relevant regulations of building services engineering and learn to apply them appropriately to technical problems. They are given an overview of modern heating, ventilation, air-conditioning and sanitary engineering systems. Students develop the competence to correctly interpret technical tasks from the perspective of supply engineering and to implement them in a professional engineering manner. The knowledge is consolidated in subject-specific laboratory exercises.	3 and 4	10
4VU-GEE-34	Foundations of Renewable Energies	The module provides students with a comprehensive overview of the possible use of renewable energies. Both philosophical and technical studies are taken into account in order to promote environmental awareness among the students. Based on technical considerations, students are enabled to set up sensible system configurations for special applications, which are ecologically and economically justifiable and are thus applicable in practice. On this basis, the students are	3 and 4	8

		expected to design the relevant systems in a specialist manner. The acquired knowledge and competences are supported and deepened in corresponding laboratory exercises.		
<b>Modules Degree Program "Technical Building Services"</b>				
4VU-AHT-56	Applied Heating Technology	Students are enabled to plan, design and calculate complete heating systems in accordance with the technical rules. This also includes the integration of alternative systems for the use of renewable energies for heat generation. In addition to the design of the corresponding systems, environmental protection regulations are also discussed, and the relevant measures for planning and design are developed.	5 and 6	5
4VU-ALK-56	Applied Ventilation and Air-conditioning Technology	Students are enabled to plan, design and calculate ventilation and air-conditioning components as well as complete ventilation and air-conditioning systems in accordance with recognized technical rules, current requirements and the need for energy efficiency. This includes the integration of alternative systems for the use of renewable energies, the necessity of heat recovery and waste heat utilization. In addition to the design of the corresponding systems, environmental protection regulations are also discussed, and the relevant measures for planning and design are developed.	5 and 6	7
4VU-KÄTGL-34	Refrigeration Technology 1 - Foundations	The module enables students to acquire and safely apply knowledge in the field of refrigeration technology with a focus on cold vapor compression chillers. Students are capable of defining refrigeration problems and implementing them in technical solutions. The module also deals with ways to minimize the energy demand for the technical production of cold and to reduce environmentally relevant emissions.	3 and 4	6
4VU-GAUT-50	Building Automation	The module imparts knowledge of building installation techniques for various applications in building services engineering and of the interlinking of buildings for the control, monitoring and energy-efficient operation of plant technology, e.g. BUS systems. Students acquire skills and abilities that enable them to evaluate overall concepts of a technical supply system and to draw appropriate conclusions for practical implementation under various aspects of building automation.	5	4
4VU-EES-60	Renewable Energies and Energy Systems Analysis	The module aims to impart the fundamentals of the energy industry, the classification of energy sources, the types of energy, the structure of primary energy consumption and the growing importance of renewable energies. This includes the analysis of most important energy sources and their market, and the discussion of basic business management concepts such as investment, financing, operational values and depreciation as well as the development of the value of capital. Students acquire knowledge of investment evaluation using various methods and apply this	6	5

		investment assessment to building services installations. Students are familiarized with the calculation of capital, demand and operation-related costs. Furthermore, the legal basis for the use of renewable energies is analyzed.		
<b>Modules of Specialization "Technical Building Systems" (field of study: „Technical Building Services“)</b>				
4VU-GAS-45	Gas and Exhaust Systems in Buildings	The module imparts fundamental technical knowledge in the field of gas supply for buildings and properties as well as exhaust gas technology. This includes an outline of the special features of the individual fuel gases that are relevant for use in buildings. Apart from central plants using natural gas as fuel gas, the module also deals with liquid gas plants. Students thus acquire the ability to design and calculate gas supply and exhaust systems in accordance with technical rules and regulations.	4 and 5	6
4VU-SANI-56	Applied Sanitary Technology	Students acquire specialist knowledge in the fields of drinking water supply, hot water production and drainage technology. Focus is laid on planning requirements, such as hygiene-conscious design in compliance with the Drinking Water Ordinance, energy-efficient heating of drinking water and environmentally friendly drainage technology. Students are thus enabled to optimally plan and calculate sanitary engineering systems.	5 and 6	4
4VU-PPTGS-56	Planning / Project Planning in Building Services Engineering	Students learn to apply and implement the knowledge acquired in the basic and specialist areas. The planning tasks are to be thoroughly analyzed by the students in order to develop realizable projects. Focus is laid on the acquisition of competences in the area of ready-to-use knowledge. Moreover, students work in teams to increase their social competence. Students are supposed to come up with a project that can be implemented in practice in a concrete and sustainable way and which meets all technical rules and requirements. They are particularly encouraged to make consistent use of software packages for calculations and drawing production.	5 and 6	7
4VU-SGGU-50	Special Fields of Building and Environmental Engineering	The module aims to impart knowledge on special, partly interdisciplinary topics of building services engineering as well as on environmental regulations and measures in the field of supply and environmental technology. The topics are based on current developments and innovations and cover special areas of building services engineering, such as rainwater utilization and swimming pool technology. Expert knowledge of basic methods for recording and assessing pollutants in exhaust gases and knowledge of the individual procedures for reducing emissions enable students to select concrete techniques for the respective problem and provide suppliers of environmental protection technology with the necessary basic data for further specialist planning.	5	6

<b>Modules of Specialization "Refrigeration and Air Conditioning Technology" (field of study: „Technical Building Services“)</b>				
4VU-KÄTPR-45	Refrigeration Technology 2 - Processes	Students are familiarized with the different methods of cold generation and enabled to present them in diagrams and calculate them. The module also considers the different temperature ranges and the coupling with other energy conversion processes.	4 and 5	6
4VU-KÄTKA-56	Refrigeration Technology 3 – Components and Working Materials	Students are familiarized with all components of the different refrigeration processes, their functions and design. The components of I&C and safety technology are also considered. Students gain knowledge about the different working materials, their application and the working areas.	5 and 6	4
4VU-KÄTKG-50	Refrigeration Technology 4 – Air Conditioning, Commercial and Small Refrigeration	Students gain knowledge about the different fields of application of refrigeration technology and their particularities. In addition to refrigeration, the module also examines cold distribution, storage, maintenance and operation as well as energy efficiency.	5	6
4VU-PPKÄT-56	Planning / Project Planning in Refrigeration Technology	The module enables students to apply and implement the acquired knowledge in the basic and special fields of refrigeration and air conditioning engineering. Students are to thoroughly analyze the planning tasks in order to design realizable projects. Focus is laid on the acquisition of skills in the area of ready-to-use knowledge. At the same time, working in teams contributes to the strengthening of social competence. Students are supposed to come up with a project that can be implemented in practice in a concrete and sustainable way and which meets all technical rules and requirements. They are particularly encouraged to make consistent use of software packages for calculations and drawing production.	5 and 6	7
<b>Modules: Field of study "Thermal Power Engineering and Supply Systems"</b>				
4VU-BVT-45	Building and Surveying Technology	The course aims to impart knowledge for the planning of pipeline routes. For this purpose, it is first of all necessary to convey the principles of planning in the form of surveying technology and the professional processing of relevant results. For professional pipeline route planning, students are familiarized with possible technologies of pipeline laying. In this respect, the media distribution systems are always to be considered up to the end user. Another focus is laid on the refurbishment of existing pipeline systems, a problem that will become increasingly important in Germany and Europe in the coming years. The acquired knowledge and competences are substantiated and deepened in corresponding laboratory exercises.	4 and 5	6

4VU-RHYD-56	Pipe Hydraulics	In this module, students acquire and confidently apply basic knowledge of physics and fluid mechanics, and are enabled to scientifically model technical problems. Furthermore, students acquire the competence to analyze technical tasks in a scientifically correct way and to implement them in a professional manner. This includes the ability to understand different network structures in order to draw the right conclusions for the design of the respective plants and technically correct pipe networks. The acquired knowledge and competences are substantiated and deepened in corresponding laboratory exercises.	5 and 6	5
4VU-RST-56	Pipe Statics	Students learn how to confidently apply the respective calculation models in accordance with the associated hypothesis. For this purpose, students acquire the competence to thoroughly analyze tube geometries in order to subsequently perform all necessary calculations for the static analysis. The purpose of the investigations is to ensure that designed pipe geometries do not pose any risk to humans or the environment in all operating conditions and operating periods. For this reason, students acquire the competence to interpret and correctly evaluate calculation results.	5 and 6	5
4VU-TES-50	Thermal Energy Systems	Students are familiarized with the technical procedures for the provision of energy, which is required in various forms, e.g. thermal energy, electrical energy, etc. The module examines both the possibilities of providing energy from fossil fuels and the possibility of working with alternative energy sources. To this end, it is essential that students have a fundamental knowledge of the transformation processes. Based on this experience, students are expected to draw conclusions for the optimization of the processes. For all these processes it will be necessary to consider socio-political, economic and ecological factors. The acquired knowledge and competences are substantiated and deepened in corresponding laboratory exercises.	5	5
4VU-KÄTEV-34	Refrigeration	The module enables students to acquire and safely apply knowledge in the field of refrigeration technology with a focus on cold vapor compression chillers and their application in the field of thermal energy engineering. Students are capable of defining refrigeration problems and implementing them in technical solutions. The module also deals with ways to minimize the energy demand for the technical production of cold and to reduce environmentally relevant emissions.	3 and 4	6
4VU-SVT-50	Systems and Process Engineering	Students acquire knowledge of the technical and biological-chemical processes for processing the respective media thus being able to define the individual natural and technical circulation systems. Furthermore, students are capable of intervening in the various process stages in a professional manner in order to optimize the processes. Process optimization requires comprehensive knowledge of the individual components of the corresponding process stages.	5	5

		The acquired knowledge and competences are substantiated and deepened in corresponding laboratory exercises.		
4VU-AES-60	Use of Renewable Energies and Energetic Systems Analysis	Students are familiarized with processes and possibilities for the application of renewable energies and deepen their knowledge of systems that provide such resources (energy and water) or store them for a required period of time. Furthermore, students get to know new technologies and their system components. This enables them to plan systems that use renewable energies. Focus is always laid on the economical use of available resources, so that the environmental aspect plays an essential role in the assessment of these technologies. Moreover, students are enabled to carry out economic system assessments for these plants and draw conclusions for a feasible practical application. The acquired knowledge and competences are to be deepened in laboratory exercises.	6	5
4VU-PPTEV-56	Planning/ Project Planning	Students learn to apply and implement the knowledge acquired in the basic and specialist areas. The planning tasks are to be thoroughly analyzed by the students in order to develop realizable projects. Focus is laid on the acquisition of competences in the area of ready-to-use knowledge. Moreover, students work in teams to increase their social competence. The use of all available planning tools is practiced. Students are supposed to come up with a project that can be implemented in practice in a concrete and sustainable way and which meets all technical rules and requirements. They are particularly encouraged to make consistent use of software packages for calculations and drawing production.	5 and 6	7
4VU-SGET-50	Special Fields of Power Engineering	The module imparts specific and complementary knowledge of how to improve and optimize energy supply systems in a rational way. Focus is laid on both innovative technologies as well as the automation of plants with modern MSR technology and the economic design of plants, e.g. through technical insulation systems. Students acquire the competence to design energy-efficient systems and operate them securely. To this end, students are familiarized with the latest plant and energy contracting systems.	5 and 6	6
<b>Practical modules</b>				
4VU-PM1-10	VU Processes in the Company	The first practical phase familiarizes students with their workplace, their practice company and elementary processes and activities. They deal with the information systems used in the company and are able to use them to solve pending tasks. They are directly integrated into practical teams and thus receive essential impulses for the development of new or consolidation of existing social skills. Students consolidate the professional knowledge acquired in the theoretical modules and apply it in an exemplary manner in operational practice.	1	6



4VU-PM2-20	Consolidation of Basic Skills	This practical phase focuses on practical applications and functions of technical supply systems and system components. Students extend their basic skills in the evaluation of technical documentation in terms of information content for relevant assemblies and products. Students consolidate the specialist knowledge acquired in the theory modules, apply it to operational tasks and document their knowledge enhancement in the paper to be produced.	2	6
4VU-PM3-30	Introduction to Engineering Work	This practical imparts knowledge of engineering interrelationships. Students are able to capture and classify the necessary input information for internal documentation processing. They are enabled to develop necessary solutions from the customer's or contractor's point of view and take the first steps towards their implementation. Students derive subtasks, which they work on in a team.	3	6
4VU-PM4-40	Independent Engineering Work	Upon completion of this module, students are able to apply and utilize professional competencies of engineering work in a problem-oriented manner. They are enabled to work scientifically and practically on complex tasks and participate constructively in the solution of tasks. Students work on in-depth problems and demonstrate their knowledge and skills in project paper.	4	6
4VU-PM5-56	Autonomous Engineering Work	In this practical phase, students work independently and autonomously on complex specialist tasks, sub-areas and documentation sections with a focus on their future field of activity, taking into account previously acquired theoretical knowledge. The aim is to integrate the solution into the company's processes, including the analysis of the associated information paths. Through a practical task, a seminar paper and a practice-related oral examination, students prove their ability to work as engineering professionals.	5 and 6	6
4VU-DA-60	Thesis (Diplomarbeit)	In their theses, students solve a practical engineering problem within the stipulated timeframe and in target- and result-oriented way. They are supposed to apply their acquired theoretical, methodological and practical expertise and present their results in a logically structured and comprehensible scientific work. Students defend their thesis in a scientific discussion thus proving their knowledge and competences as well as communication and argumentation skills.	6	12