Name des Moduls (Name of Module):

#### Introduction on Renewable Energy

Regelarbeitsaufwand für das Modul (ECTS-Credits):

ECTS

3

Bildungsziele des Moduls (Learning Outcomes)

- Students master the essential foundations of physics and chemistry in the field of energy. In addition to this, they are able to describe the fundamentals of the energy industry and energy markets.
- Students are able to explain how renewable energy technologies work and gain an insight into the associated opportunities and potential.
- Furthermore, they are able to set out a cost and risk analysis for the use of assets to exploit renewable forms of energy.
- Students are able to identify energy systems in the fields of both renewable and conventional energy sources.
- They are able to describe the mechanisms and processes involved in the conversion of primary energy and the provision of useable energy and energy services.
- Students are able to evaluate and compare, from an economic, technical and ecological point of view, different energy generation technologies based on renewable resources.

Inhalte des Moduls (Syllabus)

- Introduction & renewable energy
- Basics of energy & power
- Energy perspectives and the environment
- Potenials of RES & promotion instruments and policy strategies for RES
- Economics of electricity generation from renewables
- International survey on heating, transport and electricity
- Introductory soft skills & how to write scientific papers

Erwartete Vorkenntnisse (Expected Prerequisites)

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Verpflichtende Voraussetzungen für das Modul sowie für einzelne Lehrveranstaltungen des Moduls (Obligatory Prerequisites)

Angewandte Lehr- und Lernformen und geeignete Leistungsbeurteilung (Teaching and Learning Methods and Adequate Assessment of Performance)

• Lecture

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- Presentation
- Group assignments
- Discussion
- Case studies
- Module-examination: Prereading, Participation in class, Written assignment (Calculation examples), Written examination (MC test)

Lehrveranstaltungen des Moduls (Courses of Module)	ECTS	Semesterstunden (Course Hours)
Introduction on Renewable Energy (VO)	3	3

Name des Moduls (Name of Module):

### Biomass, Biofuels, and Biogas

Regelarbeitsaufwand für das Modul (ECTS-Credits):

ECTS

15

Bildungsziele des Moduls (Learning Outcomes)

- Students master the essential foundations of physics and chemistry in the field of bioenergy sources (biomass/biogas/biofuels).
- Students are able to explain in principle the function of bioenergy technologies, as well as of installations for utilising these energy sources.
- Students are able to support and evaluate bioenergy projects from a technical point of view as well as assess them in the light of cost-effectiveness.
- They are able to use tools for the cost and risk analysis of projects in the field of bioenergy sources and prepare and explain the results to specific target groups.
- They are able to analyse and evaluate not only the potential, but also the limitations of the use of bioenergy sources.
- Students are acquainted with tools and methods for Life Cycle Assessment (LCA) and are able to use and apply them.
- Students are able to implement energy projects in the field of bioenergy sources, both independently and taking full responsibility for their work. They are able to adapt existing knowledge to specific situations and circumstances and proceed analytically and creatively in these situations.
- On the basis of what has been learned, they are able to independently determine the most appropriate bioenergy technology for a given site, taking account of the relevant data and principles (site selection).
- They are able to address and evaluate, from an economic, technical and environmental point of view, different energy supply technologies based on bioenergy sources.

Inhalte des Moduls (Syllabus)			
<ul> <li>General introduction to environmental challenges for bioenergy – Life cycle assessment &amp; ecological resource management</li> <li>Fundamentals of thermal biomass utilization &amp; planning, constructing and implementing of plants for the use of biomass &amp; operation, maintenance, economic evaluation and risk aspects of biomass utilization</li> <li>Plant engineering for the energetic use of biomass-fuel (biodiesel, ethanol, 2nd generation)</li> <li>Planning, construction &amp; implementation of biogas plants &amp; operation maintenance, economic evaluation and risk aspects of biogas plants</li> <li>Planning, construction &amp; implementation of biogas plants</li> <li>Biogas upgrading and feed into the gas grid</li> <li>Practical examples</li> </ul>			
Erwartete Vorkenntnisse (Expected Prerequisites)			
Verpflichtende Voraussetzungen für das Modul sowie für einz Moduls (Obligatory Prerequisites)	elne Lehrv	eranstaltungen des	
Successful participation in the preceding module "Introducti	ion on Ren	ewable Energy".	
Angewandte Lehr- und Lernformen und geeignete Leistungsbeur Methods and Adequate Assessment of Performance)	teilung (Tea	aching and Learning	
<ul> <li>Lecture</li> <li>Presentation</li> <li>Group assignments</li> <li>Discussion</li> <li>Case studies</li> <li>Module-examination: Prereading, Participation in class, Homework, Written examination (MC test)</li> </ul>			
Lehrveranstaltungen des Moduls (Courses of Module)	ECTS	Semesterstunden (Course Hours)	
Biomass, Biofuels, and Biogas (VU)	15	6	

Name des Moduls (Name of Module):

#### Solar Energy – Solar Heating and Photovoltaics

Regelarbeitsaufwand für das Modul (ECTS-Credits):

ECTS

10

Bildungsziele des Moduls (Learning Outcomes)

- Students master the essential foundations of physics and chemistry in the field of solar energy (solar thermal/photovoltaic).
- Students are able to explain in principle the function of solar energy technologies, as well as of installations for the use of these energy sources.
- Students are able to support and evaluate solar energy projects from a technical point of view as well as assess them in the light of cost-effectiveness.
- They are able to use tools for the cost and risk analysis of projects in the field of solar energy and prepare and explain the results to specific target groups.
- They are able to analyse and evaluate not only the potential, but also the limitations of the use of solar energy.
- Students are able to implement energy projects in the field of solar energy sources, both independently and taking full responsibility for their work. They are able to adapt existing knowledge to specific situations and circumstances and proceed analytically and creatively in these situations.
- On the basis of what has been learned, they are independently able to determine the most appropriate solar energy technology for a given site, taking account of the relevant data and principles (site selection).
- They are able to address and evaluate, from an economic, technical and environmental point of view, different energy supply technologies based on solar energy.

### Inhalte des Moduls (Syllabus)

- Physical principles of the use of solar energy
- Potentials
- Plant engineering for the use of solar energy (electric, thermal)
- Planning, construction, implementation, operation and maintenance of photovoltaic systems
- Economic evaluation, risk and cost aspects
- Practical examples

Erwartete Vorkenntnisse (Expected Prerequisites)

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Verpflichtende Voraussetzungen für das Modul sowie für einzelne Lehrveranstaltungen des Moduls (Obligatory Prerequisites)

Successful participation in the preceding module "Introduction on Renewable Energy".

- Lecture •
- Presentation •
- Group assignments Discussion •
- •
- Case studies .
- Module-examination: Prereading, Participation in class, Homework, Written examination (MC test) •

Lehrveranstaltungen des Moduls (Courses of Module)	ECTS	Semesterstunden (Course Hours)
Solar Energy – Solar Heating and Photovoltaics (VU)	10	4

Name des Moduls (Name of Module):

#### Geothermal Energy, Wind Power, and Small Hydro Power

Regelarbeitsaufwand für das Modul (ECTS-Credits):

ECTS

15

Bildungsziele des Moduls (Learning Outcomes)

- Students master the essential foundations of physics and chemistry in the field of geothermal, wind and hydropower energy.
- Students are able to explain in principle the function of geothermal, wind and hydropower technologies, as well as of installations for the use of these energy sources.
- Students are able to support and evaluate geothermal, wind and hydroelectric projects from a technical point of view as well as assess them in the light of cost-effectiveness.
- They are able to use tools for the cost and risk analysis of projects in the field of geothermal, wind and hydropower energy and prepare and explain the results to specific target groups.
- They are able to analyse and evaluate not only the potential, but also the limitations of the use of geothermal energy, wind energy and hydropower.
- Students are able to implement energy projects in the field of geothermal energy, wind energy and hydropower, both independently and taking full responsibility for their work. They are able to adapt existing knowledge to specific situations and circumstances and proceed analytically and creatively in these situations.
- On the basis of what has been learned, they are able to independently determine the most appropriate geothermal, wind and hydropower technology for a given site, taking account of the relevant data and principles (site selection).
- They are able to address and evaluate, from an economic, technical and environmental point of view, different energy supply technologies based on geothermal energy, wind energy and hydropower.

Inhalte des Moduls (Syllabus)

- Technical units & physical basic
- Geothermal power plant types; power plant components; geothermal resources and potentials
- Wind power Technical systems, management & controlling
- Development of planning of wind projects
- Pump storage systems for wind power
- Off-shore wind parks
- Basics of small hydro power
- Structural design of SHP plants
- Mechanical & electrical equipment of SHPP
- Marine power
- Practical examples

Erwartete Vorkenntnisse (Expected Prerequisites)

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Verpflichtende Voraussetzungen für das Modul sowie für einzelne Lehrveranstaltungen des Moduls (Obligatory Prerequisites)

Successful participation in the preceding module "Introduction on Renewable Energy".

- Lecture
- Presentation
- Group assignments
- Discussion
- Case studies
- Module-examination: Prereading, Participation in class, Homework, Written examination (MC test)

Lehrveranstaltungen des Moduls (Courses of Module)	ECTS	Semesterstunden (Course Hours)
Geothermal Energy, Wind Power, and Small Hydro Power (VU)	15	6

Name des Moduls (Name of Module):

#### Efficient Energy Use and Thermal Building Optimization

Regelarbeitsaufwand für das Modul (ECTS-Credits):

ECTS

8

Bildungsziele des Moduls (Learning Outcomes)

- Students master the essential foundations of physics and chemistry in the field of energy efficiency and building optimisation, specifically construction physics and thermal building design.
- Furthermore, they are aware of the EU Energy Efficiency Directive and its impact on the energy sector.
- Students are able to calculate heat balances, carry out comparative ecological building reviews and calculate the energy needs of buildings.
- They are able to plan local and regional energy strategies taking into account all relevant specifications.
- They are able to prepare energy contracts for businesses and communities.
- They are able to use tools for the cost and risk analysis of projects in energy
  efficiency and building optimisation and prepare and explain the results to
  specific target groups.
- Students are able to implement energy projects in energy efficiency and building optimisation, both independently and taking full responsibility for their work. They are able to adapt existing knowledge to specific situations and circumstances and proceed analytically and creatively in these situations.
- Furthermore, they are able to classify model regions and to develop, implement and monitor appropriate measures in the energy sector for these regions.

#### Inhalte des Moduls (Syllabus)

- Communal & regional energy concepts; development of measures for model region
- Energy performance contracton for building refurbishment
- Inside & outside climate conditions & thermal comfort; energy demand calculation
- Solar architecture overview, examples, office buildings
- Energy efficient mobility & chemical storages

Erwartete Vorkenntnisse (Expected Prerequisites)

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Verpflichtende Voraussetzungen für das Modul sowie für einzelne Lehrveranstaltungen des Moduls (Obligatory Prerequisites)

Successful participation in the preceding module "Introduction on Renewable Energy".

- Lecture
- Presentation
- Group assignments
- Discussion
- Case studies
- Mode of examination: Prereading, Participation in class, Calculation assignment, Written assignment (Project & Project Analysis), Written examination (MC test)

Lehrveranstaltungen des Moduls (Courses of Module)	ECTS	Semesterstunden (Course Hours)
Efficient Energy Use and Thermal Building Optimization (VU)	8	4

Name des Moduls (Name of Module):

#### General Legal and Economical Frameworks

Regelarbeitsaufwand für das Modul (ECTS-Credits):

ECTS

8

Bildungsziele des Moduls (Learning Outcomes)

- Students master the basics of accounting, internal corporate accounting and controlling.
- They have knowledge of financial instruments, plans and models as well as of support systems and support opportunities, especially in the field of EU programmes.
- They are acquainted with and understand the economic importance and the effects of renewable energy technologies on energy systems for example on the power grid.
- Students are able to set out how various energy technologies influence the power grid and how they can be integrated usefully into this.
- They recognise the impact of political, legal and economic conditions on the energy sector, understand current developments and are acquainted with selected practical cases and related legal judgments. They recognise legal problems and are able to prevent these. They understand legal principles in the field of renewable energy and are able to consider and apply their essential features.
- They are able to independently prepare business and financial plans for energy projects.
- Students have an overview in the fields of business law and its fundamental impact on business practice, so that they are able to classify and evaluate new subject matter appropriately.
- They are able to use tools for the cost and risk analysis of projects in renewable energy and prepare and explain the results to specific target groups.
- Students are able to implement the acquired financial instruments and energy projects, both independently and taking full responsibility for their work. They are able to adapt existing knowledge to specific situations and circumstances and proceed analytically and creatively in these situations..

Inhalte des Moduls (Syllabus)

- Principles of accounting
- Valuation and financing of energy projects
- Business plans for energy projects
- PPP models; Tax law
- Legal aspects of REN according to the EU regulatory system; Austrian national legal basis for REN

Erwartete Vorkenntnisse (Expected Prerequisites)

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Verpflichtende Voraussetzungen für das Modul sowie für einzelne Lehrveranstaltungen des Moduls (Obligatory Prerequisites)

Successful participation in the preceding modules "Introduction on Renewable Energy", "Biomass, Biofuels, and Biogas", "Solar Energy – Solar Heating and Photovoltaics" and "Geothermal Energy, Wind Power, and Small Hydro Power"

- Lecture
- Presentation
- Group assignments
- Discussion
- Case studies
- Module-examination: Prereading, Participation in class, Homework (Business Plan - group assignment), Written examination (MC test)

Lehrveranstaltungen des Moduls (Courses of Module)	ECTS	Semesterstunden (Course Hours)
General Legal and Economical Frameworks (VO)	8	4

Name des Moduls (Name of Module):

#### Integration of Renewable Energy Sources into the Energy System

Regelarbeitsaufwand für das Modul (ECTS-Credits):

ECTS

9

Bildungsziele des Moduls (Learning Outcomes)

- Students have advanced knowledge about the functions of renewable energy technologies and are able to differentiate the associated opportunities and potentials. They are also acquainted with not only the specific features, but also the limitations of the use of renewable energy.
- They are able to describe the market integration and storage of renewable energy sources and their direct marketing.
- Students are able to set out how the various energy technologies influence the power grid and how they can be integrated usefully into this. They can describe the role, responsibilities and structures of power grids.
- Students are able to explain parameters influencing the present and modelling the future energy needs and illustrate scenarios of future technologies and developments.
- They are able to use tools for the cost and risk analysis of projects in renewable energy and prepare and explain the results to specific target groups.
- Students are able to implement energy projects in the field of renewable energy, both independently and taking full responsibility for their work. They are able to adapt existing knowledge to specific situations and circumstances and proceed analytically and creatively in these situations.
- Students analyse the impact of energy projects on the environment, and have a critical awareness of developments in the field of renewable energy. On this basis, they are able to carry out comprehensive reviews of projects.

Inhalte des Moduls (Syllabus)

- Bascis of electricity grids & the future role and responsibilities of transmissions grids
- Grid integration of REN and the concepts of smart grids
- Electricity markets; marketing integration of REN and storages
- Direct marketing of green electricity
- Country Modules in selected CEE/SEE-countries

Erwartete Vorkenntnisse (Expected Prerequisites)

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Verpflichtende Voraussetzungen für das Modul sowie für einzelne Lehrveranstaltungen des Moduls (Obligatory Prerequisites)

Successful participation in the preceding modules "Introduction on Renewable Energy", "Biomass, Biofuels, and Biogas", "Solar Energy – Solar Heating and Photovoltaics" and "Geothermal Energy, Wind Power, and Small Hydro Power"

- Lecture
- Presentation
- Group assignments
- Discussion
- Case studies
- Mode of examination: Prereading, Participation in class, Written assignment (calculation example), Written examination (MC test), Homework (Country Report – group assignment)

Lehrveranstaltungen des Moduls (Courses of Module)	ECTS	Semesterstunden (Course Hours)
Integration of Renewable Energy Sources into the Energy System (VO)	9	7

Modulbeschreibung (Module Descriptor)		
Name des Moduls (Name of Module):		
Management and Soft Skills		
Regelarbeitsaufwand für das Modul (ECTS-Credits):       4       ECTS		
Bildungsziele des Moduls (Learning Outcomes)		
<ul> <li>Students are able to present convincingly and use effective tools for leadership, team management and human resources development.</li> <li>They are able to prepare all information relevant to their professional environment for specific target groups and communicate this in a comprehensible manner.</li> <li>They are able to manipulate tools designed for effective public relations, taking into account any business-specific aspects and applying these.</li> <li>Students have the necessary language skills to implement and apply the acquired knowledge and skills, including English-language skills.</li> <li>They apply project management methods, adapted to their individual professional situation or to operational or other special circumstances. They are able to assess the progress of the project properly.</li> <li>They lead technical discussions, represent their own points of view and are able to justify this. They recognise conflicts, are able to identify the core problem and develop appropriate solutions.</li> <li>They are able to lead interdisciplinary teams, give clear instructions, guide and make appropriate management decisions. They can overcome problems or resistance in an intercultural environment.</li> </ul>		
nhalte des Moduls (Syllabus)		
<ul> <li>Successful presentations</li> <li>Leadership and team management</li> <li>Public participation</li> <li>Conflict management</li> <li>Public Relations</li> </ul>		
Erwartete Vorkenntnisse (Expected Prerequisites)		
Verpflichtende Voraussetzungen für das Modul sowie für einzelne Lehrveranstaltungen des Moduls (Obligatory Prerequisites)		
Successful participation in the preceding modules "Introduction on Renewable Energy", 'Biomass, Biofuels, and Biogas", "Solar Energy – Solar Heating and Photovoltaics" and 'Geothermal Energy, Wind Power, and Small Hydro Power"		

- Lecture •
- Presentation •
- Group assignments Discussion •
- •
- Case studies
- Mode of examination: Prereading, Participation in class, Presentation of homeworks or reports, Written assignment (PR activity) •

Lehrveranstaltungen des Moduls (Courses of Module)	ECTS	Semesterstunden (Course Hours)
Management and Soft Skills (VU)	4	4

Name des Moduls (Name of Module):

#### Perspectives on the Use of Renewable Energy

Regelarbeitsaufwand für das Modul (ECTS-Credits):

ECTS

3

Bildungsziele des Moduls (Learning Outcomes)

- Students are able to identify future trends and developments in the field of production, distribution and consumption of renewable energy.
- They are able to analyse and evaluate not only the opportunities and potential, but also the specific features and limitations of their use.
- Students are able to explain parameters influencing the present and modelling the future energy needs and illustrate scenarios of future technologies and developments.
- Students are able to independently investigate new technologies and their application, as well as assess and evaluate them from an economic, energy and ecological point of view.
- Students analyse the impact of new renewable energy technologies on the environment and have a critical awareness of new knowledge and developments in this area. On this basis, they are able to carry out comprehensive reviews of projects.
- Students are able to incorporate future developments into their existing knowledge, to make links with what they already know and to implement their own projects on this basis.

Inhalte des Moduls (Syllabus)

- Current and future drivers of energy consumption
- Perspectives for future technologies (hydrogen, windgas, biorefineries)
- Environmental protection and climate change; Overall implications
- Future Scenarios for the development of the world energy systems

Erwartete Vorkenntnisse (Expected Prerequisites)

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Verpflichtende Voraussetzungen für das Modul sowie für einzelne Lehrveranstaltungen des Moduls (Obligatory Prerequisites)

Successful participation in the preceding modules "Introduction on Renewable Energy", "Biomass, Biofuels, and Biogas", "Solar Energy – Solar Heating and Photovoltaics", "Geothermal Energy, Wind Power, and Small Hydro Power", "Efficient Energy Use and The

- Lecture •
- Presentation •
- Group assignments Discussion •
- •
- Case studies .
- Module-examination: Prereading, Participation in class, Written examination • (MC test)

Lehrveranstaltungen des Moduls (Courses of Module)	ECTS	Semesterstunden (Course Hours)
Perspectives on the Use of Renewable Energy (VO)	3	2

Name des Moduls (Name of Module):

#### **Master Thesis**

Regelarbeitsaufwand für das Modul (ECTS-Credits):

ECTS

30

Bildungsziele des Moduls (Learning Outcomes)

This module qualifies the students to complete successfully and independently a Master Thesis in a selected topic within the field of Renewable Energies and in accordance with the qualification profile. They are able to apply the acquired knowledge/methods and conduct independent research on a specific and practical problem in the relevant area.

Inhalte des Moduls (Syllabus)

Writing of an academic paper (Master Thesis) on a free selected topic (Ideally, the Master Thesis should have an applied character and practical value is desired. Students are encouraged to choose a specific and practical problem from their occupational activity)

Erwartete Vorkenntnisse (Expected Prerequisites)

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Verpflichtende Voraussetzungen für das Modul sowie für einzelne Lehrveranstaltungen des Moduls (Obligatory Prerequisites)

Successful participation in the preceding modules "Introduction on Renewable Energy", "Biomass, Biofuels, and Biogas", "Solar Energy – Solar Heating and Photovoltaics", "Geothermal Energy, Wind Power, and Small Hydro Power", "Efficient Energy Use and Thermal Building Optimization".

- Lecture
- Presentation Library
- Introduction Database research

Lehrveranstaltungen des Moduls (Courses of Module)	ECTS	Semesterstunden (Course Hours)
Master Thesis	27	
Master Thesis Seminar	3	2