

# Environmental Engineering

## 1. cycle academic study programme

### 1 General description of the programme

The university study programme of the first cycle “Environmental Engineering” within the Faculty of Mechanical Engineering lasts three years. A student has to acquire 180 ECTS points. The study programme is aligned with the Bologna directives. It represents the basis for the master study programme of the second cycle with the same name as well as the doctoral (PhD) study of environmental engineering at the third cycle.

Students of the Environmental Engineering study programme complement their knowledge of engineering with courses in environmental sciences.

The study programme is related to other study programmes in Europe. Three study programmes “Environmental Engineering” from the high-ranked universities (according to Shanghai university rankings) were taken as the benchmark and comparison: ETH Zürich, Swiss, TU Delft, Netherlands and TU Wien, Austria.

The Environmental Engineering study programme contains a balanced combination of knowledge that is in alignment with the recommendations of the European Society for Engineering Education (SEFI). It is divided into scientific and technological fundamentals, applicative and systemic knowledge with practical training and graduation (diploma).

A graduate of the programme is able to understand and apply knowledge for designing and planning of products in the field of environmental engineering. The graduate possesses broad theoretical knowledge and specific professional skills. His (hers) competences allow him (her) to work professionally, but the main goal is to prepare him (her) for further study and engineering study programmes on the second cycle, especially environmental engineering. The professional study is finished on the second cycle, and graduates of the second cycle are able to work independently, they can produce new knowledge and develop new technologies in Slovenia and worldwide economy. They can also continue their studies on PhD study programmes, which are also offered at our faculty.

The study programme covers the following areas and subjects: basic natural science subjects, technological subjects, applicative subjects, interdisciplinary subjects that are the focus of the study programme, economic and business subjects, project work and diploma thesis.

The study programme is intended to provide industry with a new breed of environmental engineers with a broad knowledge of engineering, technology, computer science,

business economics, management, etc. that will be fully qualified to take leadership, professional, development and management positions. B. Sc. in Environmental Engineering is an expert with environmental and technological knowledge to design, organise and manage large-scale environmental rigs.

## 2 Short description of the study modules

The Environmental Engineering study programme does not include any study modules.

## 3 General learning outcomes and competencies of the students

Students who earn the Environmental Engineering B. Sc. degree will specifically gain the following general competences:

- Ability to use natural sciences, mathematics and computer technology to solve technical problems;
- Ability to use analytical, experimental and simulation methods to solve practical problems in the professional field;
- Ability to integrate theoretical findings, methods of developmental research work and modern planning tools to solve complex technical problems;
- Ability to publicly introduce technical, developmental, organizational and working solutions in written or oral form;
- Autonomy in professional work, critiquing suggested solutions and taking responsibility for solutions;
- Ability to organize and lead developmental projects and professional groups;
- Ability for creative thinking;
- Ability to work in teams and to communicate in written and oral form;
- Ability to understand worldwide engineering and environmental challenges around us.

## 4 The main subject-specific learning outcomes and competencies of the students

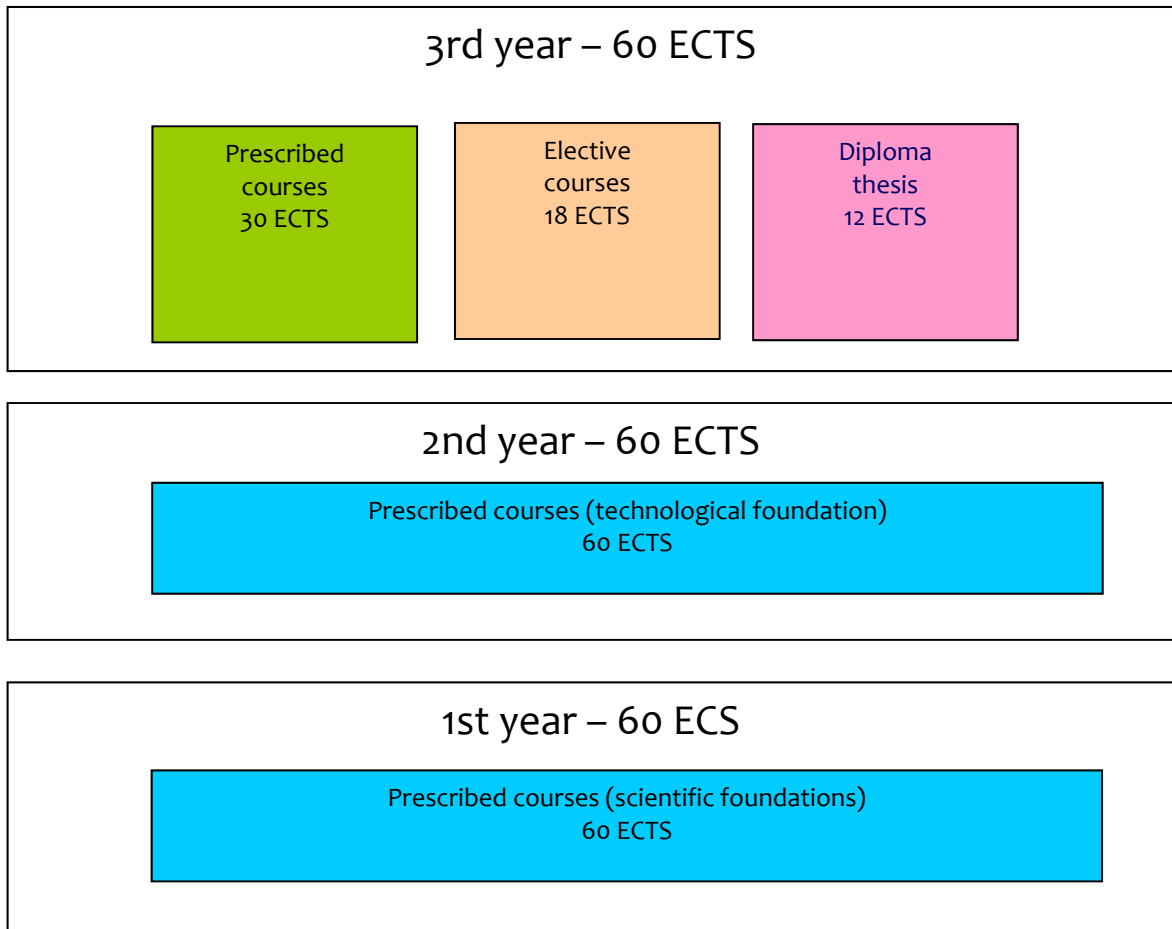
The main subject-specific competencies that can be obtained by the Environmental Engineering study programme are:

- an ability to devise, develop and apply the modern ecological technologies, and new technical concepts,
- an ability to managing with information, material and energy flows by devising, designing, assembly, disassembly and maintenance of environmental systems,

- an ability to apply and develop processes and tools for modelling, optimisation and simulation of processes, machines, devices, manufacturing methods, products and production facilities,
- an ability for interdisciplinary understand the activities in the ecological systems,
- an ability to provide a convenient quality of products by applying appropriate measurements and quality assurance,
- an ability to design mechanical elements, devices and machines,
- an ability to apply and develop computer-aided design,
- an ability to design and develop machines, devices and facilities for the energetic process and environmental engineering,
- an ability to conduct measures for flawless functioning, maintenance, and environmental correctness of products during their total life-time,
- an ability to permanently develop skills by application of knowledge on the specific professional area,
- an ability to apply modern computer, information and communication technologies on the specific professional area,
- an ability to plan and implement projects in different environments,
- an ability to think about commercial aspects of new products, systems and product-related services,
- an ability to plan and control costs,
- an ability to manage investments in equipment and facilities,

## 5 General curriculum

The university-level diploma study programme of Environmental Engineering is divided into the following parts:



## 6 Detailed curriculum

1. year							
Subject	1 <sup>st</sup> semester			Cont. hours	Individ. work	Hours	ECTS
	L	S	T				
MATHEMATICAL ANALYSIS	50	0	30	80	100	180	6
FUNDAMENTALS OF CLASSICAL PHYSICS	25	0	24	49	71	120	4
ENGINEERING INFORMATICS	25	0	25	50	70	120	4
EXPERIMENTAL METHODS	40	10	30	80	100	180	6
ENVIRONMENTAL PROTECTION LAW	15	0	10	25	65	90	3
CHEMISTRY	50	0	40	90	120	210	7
Together semester:	205	10	159	374	526	900	30

Subject	2 <sup>nd</sup> semester			Cont. hours	Individ. work	Hours	ECTS
	L	S	T				
POWERPLANT TECHNOLOGY	40	0	12	52	68	120	4
PRINCIPLES OF ENVIRONMENTAL PLANNING	25	12	15	52	98	150	5
ENVIRONMENTAL PROTECTION	40	12	12	64	116	180	6
THERMODYNAMICS	40	0	25	65	85	150	5
WAVES AND MATERIAL STRUCTURE	25	0	24	49	71	120	4
CLIMATE CHANGE	25	10	5	40	50	90	3
SAFETY AND RELIABILITY IN ENVIRONMENTAL ENGINEERING	25	0	15	40	50	90	3
Together semester:	220	34	108	362	538	900	30
<b>Together year:</b>	<b>425</b>	<b>44</b>	<b>267</b>	<b>736</b>	<b>1064</b>	<b>1800</b>	<b>60</b>

2. year							
Subject	3 <sup>rd</sup> semester			Cont. hours	Individ. work	Hours	ECTS
	L	S	T				
FLUID MECHANICS	40	0	25	65	115	180	6
MATERIALS	40	0	10	50	70	120	4
METHODOLOGIES OF ENVIRONMENTAL IMPACTS EVALUATION	25	10	20	55	95	150	5
MANAGEMENT IN PRODUCTION	25	10	15	50	70	120	4
DESIGN OF TECHNICAL SYSTEMS	30	15	30	75	75	150	5
HEAT AND MASS TRANSFER	45	0	30	75	105	180	6
Together semester:	205	35	130	370	530	900	30

Subject	4 <sup>th</sup> semester			Cont. hours	Individ. work	Hours	ECTS
	L	S	T				
BIOCHEMISTRY	45	0	30	75	105	180	6
RENEWABLE ENERGY SOURCES	38	12	15	65	115	180	6

FUNDAMENTALS OF ENVIRONMENTAL MODELING AND SIMULATIONS	40	0	35	75	105	180	6
ATMOSPHERIC POLLUTION AND CONTROL	40	10	25	75	105	180	6
ECOTOXICOLOGY	45	0	30	75	105	180	6
Together semester:	193	37	135	365	535	900	30
<b>Together year:</b>	<b>398</b>	<b>72</b>	<b>265</b>	<b>735</b>	<b>1065</b>	<b>1800</b>	<b>60</b>
3. year							
Subject	5 <sup>th</sup> semester			Cont. hours	Individ. work	Hours	ECTS
	L	S	T				
PROCESS ENGINEERING	40	0	37	77	103	180	6
WASTE TREATMENT	35	35	5	75	105	180	6
WATER TECHNOLOGY	40	12	25	77	103	180	6
SUSTAINABLE MATERIALS	25	12	12	49	131	180	6
ELECTIVE SUBJECTS 1	25	12	15	65	115	180	6
Together semester:	165	71	94	330	570	900	30

Subject	6 <sup>th</sup> semester				Cont. hours	Individ. work	Hours	ECTS
	L	S	T	K				
PROJECT WORK	0	15	0	0	15	165	180	6
ELECTIVE SUBJECTS 2	50	25	40	0	115	245	360	12
DIPLOMA WORK	0	15	0	35	50	310	360	12
Together semester:	50	55	40	35	180	720	900	30
<b>Together year:</b>	<b>215</b>	<b>126</b>	<b>134</b>	<b>35</b>	<b>510</b>	<b>1290</b>	<b>1800</b>	<b>60</b>
<b>Together 3 years:</b>	<b>1038</b>	<b>242</b>	<b>666</b>	<b>35</b>	<b>1981</b>	<b>3419</b>	<b>5400</b>	<b>180</b>

L – lectures, S – seminar; T – tutorial; K - konsultation

#### Elective subjects 1

Subject	6 <sup>th</sup> semester			Cont. hours	Individ. work	Hours	ECTS
	L	S	T				
ECOLOGY PROBLEMS OF VEHICLE AND INTERNAL COMBUSTION ENGINES	25	12	15	52	128	180	6
COMPUTER SIMULATIONS IN POWER AND PROCESS ENGINEERING	15	10	25	50	130	180	6
SPORTS I	5	0	35	40	50	90	3
SPORTS II	5	0	35	40	50	90	3
SPORTS III	5	0	35	40	50	90	3
FOREIGN LANGUAGE (ENGLISH)	35	5	0	40	50	90	3
FOREIGN LANGUAGE (GERMAN)	35	5	0	40	50	90	3

**Elective subjects 2**

Subject	6 <sup>th</sup> semester			Cont. hours	Individ. work	Hours	ECTS
	L	S	T				
SENSIBLE USE OF ENERGY	25	15	25	65	115	180	6
TECHNOLOGICAL AND WASTE WATERS	25	0	25	50	130	180	6
ENGINEERING CALCULATIONS	25	10	15	50	130	180	6
POLYMER MATERIALS RECYCLING	40	0	12	52	128	180	6