Óbuda University

Rejtő Sándor Faculty of Light Indrustry and Environmental Engineering

TRAINING PROGRAM

Environmental Engineering BSc (E)

Budapest, 01 September 2019

DEGREE PROGRAM CURRICULUM

1. Degree program name:

Environmental Engineering BSc

2. Field of training:

agricultural / economic sciences / informatics / technical / pedagogical/ natural sciences

3. Language of training:

English

4. Training schedule(s) and duration of courses in semesters, number of contact hours:

regular / evening / correspondence / distance training

5. Optional specialties:

Environmental Management Systems	regular
Environmental Public Administration specialization	regular
Green Energy specialization	regular

6. Number of credits to collect to earn degree: 210 credits

7. Level of qualification and professional qualification as indicated in the degree certificate:

- level of qualification: bachelor - BSc
- professional qualification: Environmental Engineer

8. Study area classification of professional qualification according to the standard classification system of training areas: 851

9. Educational objective:

The aim is to train environmental engineers with up-to-date knowledge and skills of applied natural sciences, ecology, technology, economics, and management. They can identify environmental hazards in various areas, and they can use their professional experience to manage prevention and remediation actions economically and efficiently. In possession of their professional knowledge and skills, they are capable to take part in the prevention, reduction and elimination of environmental pollution and damage; in endeavors towards the rational use of natural resources; and in the operation of low-waste and energy-efficient technologies. They are prepared to continue their studies at a Masters course.

10. Professional competencies to be mastered:

ENVIRONMENTAL ENGINEER

***a)* knowledge**

- Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection.

- In possession of state-of-the-art IT skills, being able to use professional databases and certain design, modelling, and simulation softwares depending on their specialty.

- Knowledge of the learning, knowledge acquisition, and data collection methods of the special fields of environment protection, their ethical limitations and problem solving techniques.

- Comprehensive knowledge of the basic features and interrelations of environmental elements and systems, as well as of the environmentally harmful substances affecting them.

- Knowledge of the concepts and tools of economics and environmental economics, project and environment management in environment protection.

- Knowledge of major environmental technologies, equipment and structures associated with each technology, including the functioning and operation thereof.

- Knowledge of the main methods to examine the quantity and quality features of environmental elements and systems, their typical measuring instruments and limitations thereof, as well as methods for the evaluation of data measured.

- Knowledge of the basics of energy management, options for energy production, their advantages and disadvantages, as well as the concept and feasibility options of sustainable development.

- Knowledge of the methodology and legal regulations for performing environmental impact assessments and for compiling impact studies.

- Knowledge of requirements and methods for health and safety, fire protection, safety engineering and remediation as related to the field of environment protection.

***b)* capabilities**

- Able to perform basic tests of the quantity and quality characteristics of environmental elements and systems by state-of-the-art measuring instruments; to draw up and implement measurement plans; and to evaluate data.

- Able to solve tasks of water, soil, air, radiation, and noise protection, as well as of waste treatment and processing at proposal level; to participate in preparing decisions; to perform authority audits; and to take part in the operation of these technologies.

- Able to perform environmental impact assessments and to participate in compiling impact studies.

- Able to apply environmental remediation methods, to prepare for and participate in remediation.

- Able to apply in practice as well the regulations and requirements of health and safety, fire protection, and safety engineering as related to their special field.

- Able to communicate both verbally and in writing in their mother tongue and in at least one foreign language, in respect of professional issues, and to continuously develop their professional skills as required.

- Able to perform public administrative and authority tasks related to environment protection after getting acquainted with the duty assigned to them.

- Adequate perseverance and endurance of monotony to perform practical operations.

- Able to carry out assignments as environmental officer.

- Able to participate in project and proposal implementation and audit tasks based on their knowledge.

- Able to carry out management duties subject to sufficient professional experience.

- Able to cooperate with engineers involved in the development and application of production and other technologies to develop the given technology in terms of environment protection.

- Able to participate creatively in engineering work based on their multidisciplinary skills, as well as to adapt to continuously changing circumstances.

- Able to reveal deficiencies in the technologies applied and process risks and to initiate mitigation measures after getting familiarized with the technology concerned.

- Able to take part in environment expertise, advisory, and decision preparation work.

***c)* attitude**

- Undertaking and authentically representing the social role of environment protection, its basic relationship with the world.

- Collaboration with civil organizations engaged in environment protection, but willing to argue in order to develop optimal solutions.

- Open to professional cooperation with specialists related to their profession but involved in other areas.

- Efforts to improve knowledge by on-going self-education and continuously update their knowledge of the world.

- Constantly upgrading their knowledge of environment protection by attending organized professional development training courses.

- Efforts to solve tasks and make management decisions by being aware of the opinions of the colleagues supervised, possibly in cooperation therewith.

- Responsible proclamation and representation of the value system of the engineering profession; openness to professionally well-founded critical remarks.

- Sharing experiences with colleagues, thus promoting their development.

***d)* autonomy and responsibility**

- Taking responsibility towards society for their decisions made in the scope of environment protection.

- Performing environmental tasks individually and managing special environment protection work independently even in unexpected decision making situations.

- Cooperation with qualified experts from other special areas (primarily economic and legal) in the course of completing professional tasks.

- Monitoring regulatory, technical, technological, and administrative changes related to the special field and enforcing them in their professional work.

11. Main training areas:

According to the Regulation of 18/2016. (VIII. 5.) EMMI	**Credit points**
Science basics (40-60 credits)	**49**
Economic and human knowledge (10-30 credits)	**13**
Technical and engineering knowledge (20-50 credits)	**28**
„Protection of environmental elements" knowledge (30-70 credits)	**35**
Environmental Analysis, Environmental Informatics (10-30 credits)	**15**
Environmental Management (10-30 credits)	**9**
Specific professional knowledge (40 credits)	**39**
Optional subjects (10 credits)	**10**
Thesis (15 credits)	**15**
Total:	**210**

12. Criteria prescribed:

Physical education: Each regular student is required to complete two semesters of Physical education. The subject is announced in semesters 2 and 3 in the model curriculum, with a load of 2 lessons per week.

Subjects to be completed in a foreign language: Each regular student participating in a bachelors training course in Hungarian is required to enroll into two professional courses offered by the university in English or German as criteria subjects, and to complete the respective testing required. In the event that a student failed to complete a criteria subject in the English language, they are required to certify their basic level English skills as provided in the Study and Examination Regulations.

Specialty language requirements:

Professional traineeship:

Professional traineeship of at least six weeks, organized at a location of professional practice. Professional traineeship is included in the criteria prescribed.

13. Foreign language requirements (to earn the degree):

The aim of the language training at the university is to help students pass the language exam which is a training and output requirement to issue the diploma and to develop professional language skills. The requirement of issuing the diploma in the basic training is an intermediate, level B2, complex general language exam.

14. Knowledge verification:

a) during the study period, by written or verbal reports, written (classroom) tests, by the evaluation of home assignments (designs, measurement records, etc.), mid-semester grading or signature,
b) by preliminary examination passed in the study period,
c) by examination or comprehensive examination passed in the examination period, and
d) by final examination.

15. Criteria for admission to a final examination:

a) Final completion certificate (absolutorium) granted,

b) Thesis accepted by supervisor.

Admission to a final examination is subject to a final completion certificate being granted. A final completion certificate is issued by a higher education institution to a student who has complied with the study and examination requirements prescribed in the curriculum and

completed the professional traineeship required – except for meeting the foreign language requirement and completion of the thesis –, and has acquired the credits prescribed.

16. Parts of the final examination:

The final examination consists of defending the thesis and oral examinations taken on the subjects prescribed in the curriculum (time allowed for preparation: at least 30 minutes per subject), to be passed by the student consecutively within the same day.
Subjects (subject groups) comprising, in the aggregate, a body of knowledge corresponding to at least 20 and up to 30 credit points may be designated for the final examination.

The list of questions of the oral examination is made available to candidates 30 days before the date of the final examination.

Candidates may start the examination if their thesis has been accepted by the final examination board with at least sufficient (2) qualification. Criteria for correcting a failed thesis are defined by the competent institute.

17. Result of the final examination:

The weighted average of the grades of the thesis and the oral part of the final examination – taking into consideration the number of subjects included in the final examination – as follows:

$$Z = (SZD + Z1 + Z2 + \ldots + Zm)/(1+m).$$

18. Criteria for issuing a diploma:

a) Successful final examination,

b) Compliance with the foreign language requirement.

19. Dual training option: -

20. Cooperative training option:

Cooperative training is a voluntary supplementary practice module linked to a regular bachelors training course at the university, in the framework of which the university and a business company, firm or institution cooperate in order to enable university students to acquire professional experience as specified in the educational objective.

21. Date of entry into effect: 01 September 2019.

Dated in Budapest, 31.08. 2019.

Dr. habil Koltai László

Dean

CURRICULUM

Óbuda University
Sándor Rejtő Faculty of Light Industry and Environmental Engineering

BSc (E) Sample curriculum
Full time training
Environmental Engineering programme
Head of profession: Dr. Mészárosné Dr. Bálint Ágnes

Decision number: RKK-KT-LXX/74/2019
Valid from 01.09.2019.

Weekly teaching hours (Lecture (L), Classroom (Cw), Laboratory work (Lw), Requirements, Credits (Cr)

	Code	Subjects	weekly hours	Credit	Semesters 1. L	Cw	Lw	R	Cr	2. L	Cw	Lw	R	Cr	3. L	Cw	Lw	R	Cr	4. L	Cw	Lw	R	Cr	5. L	Cw	Lw	R	Cr	6. L	Cw	Lw	R	Cr	7. L	Cw	Lw	R	Cr	Required prelineary knowledge Code
Science basics (40-60 Cr)		**all:**	***44***	***54***	***12***	***5***	***4***	***0***	***25***	***7***	***5***	***2***	***0***	***18***	***3***	***1***	***2***	***0***	***7***	***2***	***1***	***0***	***0***	***4***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	
1.	NMXAN1EBNE	Mathematics I.	6	6	3	3	0	e	*6*																														
2.	RKXMA2EBNE	Mathematics II.	5	6						2	3	0	e	*6*																								NMXAN1EBNE sign
3.	RMXCA1KBNE	Chemistry I.	4	5	2	0	2	e	*5*																													
4.	RMXCA2KBNE	Chemistry II.	4	5						2	0	2	e	*5*																								RMXCA1KBNE
5.	RKXAK1ABNE	Analytical chemistry	3	3											1	0	2	tm	*3*																		RMXCA2KBNE
6.	RKXFI1ABNE	Physics I.	2	3	1	1	0	tm	*3*																													
7.	RKXFI2ABNE	Physics II.	2	3						1	1	0	e	*3*																								RKXFI1ABNE
8.	RKXBI1EBNE	Biology I.	3	4	2	1	0	tm	*4*																													
9.	RKXBI2EBNE	Biology II.	3	4						2	1	0	e	*4*																								RKXBI1EBNE
10.	RKXEL1EBNE	Electrotechnics	3	4											2	1	0	tm	*4*																		
11.	RKXOK1ABNE	Ecology	3	4																2	1	0	e	*4*														RKXBI2EBNE
12.	RKXFT1ABNE	Earth sciences knowledge	4	4	2	0	2	tm	*4*																													
13.	RKXKT1ABNE	Environmental studies	2	3	2	0	0	e	*3*																													
Economic and human knowledge (10-30 Cr)		**all:**	**12**	***13***	***2***	***0***	***0***	***0***	***2***	***1***	***1***	***0***	***0***	***2***	***0***	***0***	***0***	***0***	***0***	***2***	***2***	***0***	***0***	***4***	***1***	***1***	***0***	***0***	***3***	***1***	***1***	***0***	***0***	***2***	***0***	***0***	***0***	***0***	***0***	
14.	GGXKG1QBNE	Macroeconomics	2	2	2	0	0	tm	*2*																													
15.	GGXKG2QBNE	Microeconomics	2	2						1	1	0	tm	*2*																								
16.	GSEVG2QBNE	Enterprise economics	4	4																2	2	0	e	*4*														
17.	GVXMA1QBNE	Basics of management	2	3																					1	1	0	e	*3*										
18.	RMEPR1KBNE	Project managment	2	2																										1	1	0	e	*2*						
Environmental elements protection (30-70 Cr)		**all:**	**32**	**35**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**7**	**6**	**0**	**0**	**13**	**6**	**4**	**7**	**0**	**20**	**2**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
19.	RKXKE1ABNE	Environmental elements protection I.(Water quality protection)	3	*3*											1	2	0	tm	*3*																				
20.	RKXKE2ABNE	Environmental elements protection II. (Air quality protection)	3	*3*											1	2	0	tm	*3*																				
21.	RKXKE3ABNE	Environmental elements protection III. (Soil protection)	4	*4*																2	0	2	tm	*4*														RKXFT1ABNE
22.	RKXKA1ABNE	Environmental hazards I. (Noise and Vibration Protection)	3	*3*											2	1	0	tm	3																				
23.	RKXKA2ABNE	Environmental hazards II. (Environmental Radiation Protection)	2	*2*											1	1	0	tm	*2*																				
24.	RKXKA3ABNE	Environmental hazards III. (Waste Management)	2	*2*																2	0	0	e	*2*														
25.	RKXKM1ABNE	Environmental technologies and operations I. (Water and waste water treatment technologies)	3	*3*																1	2	0	e	*3*														RKXKE1ABNE
26.	RKXKM2ABNE	Environmental technologies and operations II.(Renewable Energy)	2	*2*																					2	0	0	tm	*2*										
27.	RKXKU1ABNE	Public health	2	*2*											2	0	0	e	*2*																				RKXBI1EBNE
28.	RKXTT1ABNE	Nature and landscape protection	3	*3*																1	2	0	e	*3*														
29.	RKPPR1ABNE	Project work	2	*4*																0	0	2	tm	*4*														RKXKE1ABNE,RKXKE2ABNE, RKXKA1ABNE
30.	RKXGY1EBNE	Environmental and nature field exercises	3	*4*																0	0	3	tm	*4*														
Technical engineering skills (20-50Cr)		**all:**	**19**	**21**	**1**	**0**	**2**	**0**	**4**	**2**	**2**	**0**	**0**	**5**	**1**	**2**	**0**	**0**	**3**	**2**	**0**	**4**	**0**	**6**	**1**	**0**	**2**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
31.	RKXME1EBNE	Technical mechanics	4	*5*						2	2	0	tm	*5*																								
32.	RKXMR1EBNE	Technical drawing and documentation	3	*4*	1	0	2	tm	*4*																													
33.	RKEGZ1ABNE	Machine elements	3	*3*											1	2	0	e	*3*																				RKXMR1EBNE
34.	RKXKA1EBNE	Environmental analytics	3	*3*																1	0	2	e	*3*														RKXAK1ABNE
35.	RKXMF1ABNE	Data processing of measurements	3	*3*																					1	0	2	tm	*3*										RKXMA2EBNE
36.	RKXSV1EBNE	Open-and closed-loop control	3	*3*																1	0	2	tm	*3*														NMXAN1EBNE
Environmental analysis and environmental informatics (10-30Cr)		**all:**	**10**	**11**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**3**	**0**	**4**	**0**	**0**	**3**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**2**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
37.	RMEIN1ABNE	Informatics I.	4	*4*						1	0	3	tm	4																								
38.	RMXIN2EBNE	Informatics II.	3	*4*											0	0	3	tm	*4*																				RMEIN1ABNE
39.	RKXTI1ABNE	Geoinformatics (GIS)	3	*3*																					1	0	2	tm	*3*										
Environmental management (10-30Cr)		**all:**	**10**	**11**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**6**	**4**	**0**	**0**	**11**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
40.	RKXKZ1EBNE	Environmental managment	3	*3*																					1	2	0	tm	*3*										
41.	RKEKJ1ABNE	Environmental law	2	*3*																					2	0	0	tm	*3*										
42.	RKXHV1ABNE	Environmental impact assessment	2	*2*																					1	1	0	tm	*2*										
43.	RKXKO1ABNE	Risk analysis	3	*3*																					2	1	0	e	*3*										
		all of basics:	127	145	15	5	6	0	31	11	8	5	0	29	11	9	5	0	27	12	7	11	0	34	11	5	4	0	22	1	1	0	0	2	0	0	0	0	0	
		Exam (e)						3					4					2					6					2					1					0	
		Term mark ™						5					3					7					4					6					0					0	
		Experimental hours:				**11**					**13**					**14**					**18**					**9**					**1**					**0**		
		Total hours:				**26**					**24**					**25**					**30**					**20**					**2**					**0**		

Dr. habil Koltai László
dean

Óbuda University
Sándor Rejtő Faculty of Light Industry and Environmental Engineering

BSc (E) Sample curriculum **Valid from 01.09.2019.**
Full time training **Decision number: RKK-KT-LXX/74/2019**
Environmental Engineering programme
Environmental management systems specialization
Head of profession: Dr. Takács Áron

Weekly teaching hours (Lecture (L), Classroom (Cw), Laboratory work (Lw), Requirements, Credits (Cr)

	Code	Subjects	weekly hours	credit	Semesters																																Required preliminary knowledge
					1.					2.					3.					4.					5.					6.					7.				
					L	Cw	Lw	R	Cr	L	Cw	Lw	R	Cr	L	Cw	Lw	R	Cr	L	Cw	Lw	R	Cr	L	Cw	Lw	R	Cr	L	Cw	Lw	R	Cr	L	Cw	Lw	R	Cr	
Differentiated professional knowledge			**29**	***40***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***	**3**	**1**	**0**	**0**	***6***	**9**	**5**	**1**	**0**	***20***	**5**	**1**	**4**	**0**	***14***	
44.	RMWIH1EBNE	Industrial raw material and waste	3	*5*																										2	1	0	tm	*5*						
45.	RTEFT1EBNE	Technologies of manufacturing technologies and environmental protection	3	*5*																															2	1	0	tm	*5*	
46.	RMWQM1EBNE	Environmental quality management system	4	*5*																										2	2	0	e	*5*						
47.	RMWIM1EBNE	Integrated management systems	2	*3*																					2	0	0	tm	*3*											
48.	RMWII1ABNE	Informatics support of management systems	4	*5*																															2	0	2	tm	*5*	
49.	RMWDS1ABNE	Development of management systems I.	4	*5*																										2	2	0	e	*5*						
50.	RMWDS2ABNE	Development of management systems II.	3	*4*																															1	0	2	tm	*4*	RMWDS1ABNE
51.	RKWSI1ABNE	Environmental simulations	2	*2*																										1	0	1	tm	*2*						
52.	RKEBT1EBNE	Occupational Safety and Health	2	*3*																					1	1	0	tm	*3*											
53.	RKWBI1ABNE	Basic biotechnology	2	*3*																										2	0	0	tm	*3*						
Optional subjects			**10**	***10***																					**0**	**2**	**0**	**tm**	***2***	**0**	**8**	**0**	**tm**	***8***						
54.		Optional subjects I.	2	*2*																					0	2	0	tm	2											
55.		Optional subjects II.	2	*2*																										0	2	0	tm	2						
56.		Optional subjects III.	2	*2*																										0	2	0	tm	2						
57.		Optional subjects VI.	2	*2*																										0	2	0	tm	2						
58.		Optional subjects V.	2	*2*																										0	2	0	tm	2						
	RKDSZDEBNE	**Thesis**	**13**	***15***																																	**13**	**s**	***15***	
		Total:	**179**	***210***	**15**	**5**	**6**		***31***	**11**	**8**	**5**		***29***	**11**	**9**	**5**		***27***	**12**	**7**	**11**		***34***	**14**	**8**	**4**		***30***	**10**	**14**	**1**		***30***	**5**	**1**	**17**		***29***	
Basic+Spec.		**Total weekly teaching hours**	**179**			**26**					**24**					**25**					**30**					**26**					**25**					**23**				
		Total experimental teaching hours	**101**			11					13					14					18					12					15					18				
		Ratio of experimental teaching hours (%)	**56**																																					
		Exam (e)						3					4					2					6					2					3					0		
		Term mark (tm)						5					3					7					4					9					7					3		
Criteria required		**Physical education I.**	2	*0*						0	2	0	tm	*0*																										
		Physical education II.	2	*0*											0	2	0	tm	*0*																					
		Criteria subject 1	2	*2*											0	2	0	tm	*2*	→																				
		Criteria subject 2	2	*2*											0	2	0	tm	*2*	→																				
		Professional internship	6 weeks	0																										6 weeks									

Subject of the final examination

1.Environmental elements and nature protection
2. Development of management systems I.-II.

Dr. habil Koltai László
dean

Óbuda University
Sándor Rejtő Faculty of Light Industry and Environmental Engineering

BSc (E) Sample curriculum
Full time training
Environmental Engineering programme
Environmental Public Administration specialization
Head of profession:Bodáné Dr. Kendrovics Rita

Valid from 01.09.2019.
Decision number: RKK-KT-LXX

Weekly teaching hours (Lecture (L), Classroom (Cw), Laboratory work (Lw), Requirements, Credits (Cr)

	Code	Subjects	weekly hours	credit	Semesters																														Required prelineary knowledge
					1.					2.					3.					4.					5.					6.					7.				
					L	Cw	Lw	R	Cr	L	Cw	Lw	R	Cr	L	Cw	Lw	R	Cr	L	Cw	Lw	R	Cr	L	Cw	Lw	R	Cr	L	Cw	Lw	R	Cr	L	Cw	Lw	R	Cr	
Differentiated professional knowledge			**27**	***40***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***	**3**	**2**	**0**	**0**	**7**	**7**	**5**	**1**	**0**	***19***	**5**	**2**	**2**	**0**	***14***	
44.	RKWTU1EBNE	Environmental aspects of settlement operation I	3	*4*																					2	1	0	tm	*4*										
45.	RKWTU2EBNE	Environmental aspects of settlement operation II.	3	*5*																										2	1	0	e	*5*					RKWTU1EBNE
46.	RKWOG1EBNE	Environmental management knowledge	2	*3*																										1	1	0	e	*3*					
47.	RKWGT1EBNE	Community development	3	*5*																															1	2	0	tm	*5*	RKXKZ1EBNE
48.	RMWQM1ABNE	Environmental quality management system	4	*5*																										2	2	0	e	*5*					
49.	RMWII1ABNE	Informatics support of management systems	4	*5*																															2	0	2	tm	*5*	
50.	RKWKA1EBNE	Disaster recovery	2	*4*																															2	0	0	tm	*4*	RKEBT1EBNE
51.	RKWSI1ABNE	Environmental simulations	2	*2*																										1	0	1	tm	2					
52.	RKWPA1EBNE	Proposal writing in theory and practice	2	*4*																										1	1	0	tm	*4*					
53.	RKEBT1EBNE	Occupational Safety and Health	2	*3*																					1	1	0	tm	*3*										
Optional subjects			**10**	***10***																					**0**	**2**	**0**	**tm**	**2**	**0**	**8**	**0**	**tm**	***8***	**0**	**0**	**0**	**tm**	**0**	
54.		Optional subjects I.	2	*2*																					0	2	0	tm	2										
55.		Optional subjects II.	2	*2*																										0	2	0	tm	2					
56.		Optional subjects III.	2	*2*																										0	2	0	tm	2					
57.		Optional subjects VI.	2	*2*																										0	2	0	tm	2					
58.		Optional subjects V.	2	*2*																										0	2	0	tm	2					
	RKDSZDEBNE	**Thesis**	13	***15***																																	**13**	**s**	***15***	
		Total	**177**	***210***	**15**	**5**	**6**		***31***	**11**	**8**	**5**		***29***	**11**	**9**	**5**		***27***	**12**	**7**	**11**		***34***	**14**	**9**	**4**		***31***	**8**	**14**	**1**		***29***	**5**	**2**	**15**		***29***	
Basic+Spec.		**Total weekly teaching hours**	**177**			**26**					**24**					**25**					**30**					**27**					**23**					**22**				
		Total experimental teaching hours	**99**			11					13					14					18					13					15					17				
		Ratio of experimental teaching hours (%)	**56**																																					
		Exam (e)						3					4					2					6					2					4					0		
		Term mark (tm)						5					3					7					4					9					6					3		
Criteria required		**Physical education I.**	2	*0*						0	2	0	tm	*0*																										
		Physical education II.	2	*0*											0	2	0	tm	*0*																					
		Criteria subject 1	2	*2*											0	2	0	tm	2	→																				
		Criteria subject 2	2	*2*											0	2	0	tm	2	→																				
		Professional internship	6 weeks	0																										6 weeks										

Subject of the final examination

1.Environmental elements and nature protection
2. Environmental management knowledge and Community Development

Dr. habil Koltai László
dean

Óbuda University
Sándor Rejtő Faculty of Light Industry and Environmental Engineering

BSc (E) Sample curriculum
Full time training
Environmental Engineering programme

Valid from 01.09.2019.
Decision number: RKK-KT-LXX/74/2019

Green energy specialization

Head of profession:Dr. Biczó Imre

Weekly teaching hours (Lecture (L), Classroom (Cw), Laboratory work (Lw), Requirements, Credits (Cr)

	Code	Subjects	weekly hours	credit	Semesters																																			Required prelineary knowledge
					1.					2.					3.					4.					5.					6.					7.					
					L	Cw	Lw	R	Cr	L	Cw	Lw	R	Cr	L	Cw	Lw	R	Cr	L	Cw	Lw	R	Cr	L	Cw	Lw	R	Cr	L	Cw	Lw	R	Cr	L	Cw	Lw	R	Cr	
Differentiated professional knowledge			**29**	***40***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***	**5**	**3**	**0**	**0**	***10***	**9**	**4**	**1**	**0**	***20***	**4**	**3**	**0**	**0**	***10***	
44.	RKWMF1ABNE	The source of renewable energies I. (The application of solar energy)	3	*3*																					2	1	0	e	*3*											RKXEL1EBNE
45.	RKWMF2ABNE	The source of renewable energies II. (The application of wind power)	3	*4*																										2	1	0	e	4						
46.	RKWMF3ABNE	The source of renewable energies III. (Geothermal, water energy)	3	*4*																															2	1	0	e	4	
47.	RKWMU1EBNE	Biomass production and recovery	3	*5*																										2	1	0	e	5						
48.	RKWAE1EBNE	Alternative energy usage in practice I. (System of energetics - transport and residential application)	4	*6*																										2	2	0	e	6						
49.	RKWAE2EBNE	Alternative energy usage in practice II. (System of energetics -Building energy)	4	*6*																															2	2	0	e	*6*	
50.	RKWSI1ABNE	Environmental simulations	2	*2*																										1	0	1	tm	*2*						
51.	RKWBI1ABNE	Basic biotechnology	2	*3*																										2	0	0	tm	*3*						
52.	RKWEG1EBNE	Basic of energetics	3	*4*																					2	1	0	tm	*4*											RKXEL1EBNE
53.	RKEBT1EBNE	Occupational Safety and Health	2	*3*																					1	1	0	tm	*3*											
Optional subjects			**10**	***10***																					**0**	**2**	**0**	**tm**	***2***	**0**	**8**	**0**	**tm**	***8***						
54.		Optional subjects I.	2	*2*																					0	2	0	tm	2											
55.		Optional subjects II.	2	*2*																										0	2	0	tm	2						
56.		Optional subjects III.	2	*2*																										0	2	0	tm	2						
57.		Optional subjects VI.	2	*2*																										0	2	0	tm	2						
58.		Optional subjects V.	2	*2*																										0	2	0	tm	2						
	RKDSZDEBNE	**Thesis**	13	***15***																																	**13**	**s**	***15***	
		Total:	**179**	***210***	**15**	**5**	**6**		***31***	**11**	**8**	**5**		***29***	**11**	**9**	**5**		***27***	**12**	**7**	**11**		***34***	**16**	**10**	**4**		***34***	**10**	**13**	**1**		***30***	**4**	**3**	**13**		***25***	
Basic+Spec.		**Total weekly teaching hours**	**179**			**26**					**24**					**25**					**30**					**30**					**24**					**20**				
		Total experimental teaching hours	**100**			11					13					14					18					14					14					16				
		Ratio of experimental teaching hours (%)	**56**																																					
		Exam (e)						3					4					2					6					3					4					2		
		Term mark (tm)						5					3					7					4					9					6					0		
Criteria required		**Physical education I.**	2	*0*						0	2	0	tm	*0*																										
		Physical education II.	2	*0*											0	2	0	tm	*0*																					
		Criteria subject in English or German 1	2	*2*											0	2	0	tm	*2*	→																				
		Criteria subject in English or German 2	2	*2*											0	2	0	tm	*2*	→																				
		Professional internship	6 weeks	0																										6 weeks										

Subject of the final examination

1.Environmental elements and nature protection
2.The source of renewable energies *I.-III.*

Dr. habil Koltai László
dean

SUBJECT DESCRIPTIONS

Science basics (40-60 cr.):

Title of the course: **Mathematics I.**	***NEPTUN-code:*** **NMXAN1EBNE**	***Weekly teaching hours:*** *l+cw+lb* 3+3+0	***Credit*****:** 6 ***Exam type****:* e
Course leader: Aurél Galántai, Dr.	***Position:*** professor	***Required preliminary knowledge:*** -	
Curriculum:			
The main goal of the course is to introduce the set theory marks and to describe the algebraic and geometric properties of the real number line, complex numerical plane and the three-dimensional space. Additionally, with the help of the concepts of sequences, real functions and convergence to construct univariate differential and integral computing in a way which makes the students capable of solving any technical / mathematical / physical problems that arise in subsequent studies. + using Matlab's numerical / symbolic mathematics software suite in the education.			
Professional competencies:			
Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection. In possession of state-of-the-art IT skills, being able to use professional databases and certain design, modelling, and simulation software depending on their specialty. Able to participate creatively in engineering work based on their multidisciplinary skills, as well as to adapt to continuously changing circumstances. Open to professional cooperation with specialists related to their profession but involved in other areas.			
Literature:			
1. Thomas – Weir – Hass: Thomas' Calculus, 13e, Pearson, 2013.			
2. Anton – Bivens – Davis: Calculus, 10e, Wiley, 2012.			
3. Anton – Rorres: Elementary Linear Algebra, 11e, Wiley, 2013.			

Title of the course: Mathematics II.	***NEPTUN code:*** RKXMA2EBNE	***Weekly teaching hours:*** *l+cw+lb* 2+3+0	***Credit:*** 6 ***Exam type: e***
Course leader: Henry Mastrapa Gonzalez Dr.	***Position:*** college professor	***Required preliminary knowledge:*** NMXAN1EBNE sign	

Curriculum:

Introduction of complex numbers. The most important types of ordinary differential equations and construction of their solutions. Basic concepts of linear algebra. Vector geometry of the 3-dimensional Euclidean space. Convergence in n-dimensional Euclidean spaces. Differential calculus of functions in several variables. Geometrical problems connected to smooth curves and surfaces. Basic concepts of mathematical statistics. Construction of the line of linear regression.

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection.
In possession of state-of-the-art IT skills, being able to use professional databases and certain design, modelling, and simulation softwares depending on their specialty.
Able to participate creatively in engineering work based on their multidisciplinary skills, as well as to adapt to continuously changing circumstances.
Open to professional cooperation with specialists related to their profession but involved in other areas.

Literature:

1. Anton, H., Rorres, C.: Elementary Linear Algebra with Applications, 9e, Wiley, 2005, ISBN: 0-471-66959-8.
2. Thomas, G.B. et al.: Thomas' Calculus, 11e, Addison-Wesley, 2005, ISBN: 0-321-18558-7.
3. Scharnitzky V. (szerk) Matematikai feladatok, Tankönyvkiadó, 1989.

Comment:

Title of the course: **Chemistry I.**	***NEPTUN-code:*** RMXCA1KBNE	***Weekly teaching hours:*** *l+cw+lb* 2+0+2	***Credit*****:** 5 ***Exam type****:* e
Course leader: Csiszér Tamás Dr.	***Position:*** senior lecturer	***Required preliminary knowledge:***	

Curriculum:

The goal of the subject is to acquire the essential knowledge of the structure, properties and transformations of chemical substances. The subject discusses the characteristics and reactions of the substances through the formation of unique atomic and molecular structures through chemical bonds and interactions to the characterization of homogeneous and heterogeneous sets. It also describes the grouping, production and most important applications of elements and inorganic compounds with students. In practice, students practice solving the most important computational tasks in the field of inorganic chemistry (writing and sorting reaction equations based on oxidation numbers, stoichiometry, concentration of solutions concentration, conversion of concentration units, gas laws).

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection.
Comprehensive knowledge of the basic features and interrelations of environmental elements and systems, as well as of the environmentally harmful substances affecting them.
Knowledge of the main methods to examine the quantity and quality features of environmental elements and systems, their typical measuring instruments and limitations thereof, as well as methods for the evaluation of data measured.
Able to perform basic tests of the quantity and quality characteristics of environmental elements and systems by state-of-the-art measuring instruments; to draw up and implement measurement plans; and to evaluate data.
Able to solve tasks of water, soil, air, radiation, and noise protection, as well as of waste treatment and processing at proposal level; to participate in preparing decisions; to perform authority audits; and to take part in the operation of these technologies.
Able to reveal deficiencies in the technologies applied and process risks and to initiate mitigation measures after getting familiarized with the technology concerned.

Literature

1. A. Pahari, B. Chauhan: Engineering Chemistry, Infinity Science Press LLC, Hinghan, Massachusetts, New Delhi, India, 2007

2. Darrell Ebbing, Steven D. Gammon: General Chemistry, Cengage Learning, 2015, Cengage Learning, Boston, ISBN-13: 978-1305580343; ISBN-10: 1305580346

3. Peter G. Nelson: Introduction to Inorganic Chemistry, Key ideas and their experimental basis, 2018, 3 edition, Pages: 177, ISBN: 978-87-403-1912-5

Title of the course: **Chemistry II.**	***NEPTUN-code:*** RMXCA2KBNE	***Weekly teaching hours:*** *l+cw+lb* 2+0+2	***Credit*****:** 5 ***Exam type****:* e
Course leader: Tamás Csiszér Dr.	***Position:*** senior lecturer	***Required preliminary knowledge:*** RMXCA1KBNE	

Curriculum:

The goal of the subject is the transfer of the basic concepts of organic chemistry required for other professional subjects. During the exercises, the students can acquire basic laboratory knowledge that is essential for the successful completion of other professional subjects.

Basic Concepts of Organic Chemistry: The structure and properties of alkanes. Nomenclature. The structure, reactions and properties of open-chain unsaturated hydrocarbons. The structure, reactions and properties of closed-chain saturated and unsaturated hydrocarbons. Production, Physical and Chemical Properties of Halogenated Organic Compounds. The grouping, physical and chemical properties of oxygen-containing organic compounds. The Grouping, Structure and Properties of Nitrogenous Organic Compounds.

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection.
Comprehensive knowledge of the basic features and interrelations of environmental elements and systems, as well as of the environmentally harmful substances affecting them.
Knowledge of the main methods to examine the quantity and quality features of environmental elements and systems, their typical measuring instruments and limitations thereof, as well as methods for the evaluation of data measured.
Able to perform basic tests of the quantity and quality characteristics of environmental elements and systems by state-of-the-art measuring instruments; to draw up and implement measurement plans; and to evaluate data.
Able to solve tasks of water, soil, air, radiation, and noise protection, as well as of waste treatment and processing at proposal level; to participate in preparing decisions; to perform authority audits; and to take part in the operation of these technologies.
Able to reveal deficiencies in the technologies applied and process risks and to initiate mitigation measures after getting familiarized with the technology concerned.

Literature:

1. Darrell Ebbing, Steven D. Gammon: General Chemistry, Cengage Learning, 2015, Cengage Learning, Boston, ISBN-13: 978-1305580343; ISBN-10: 1305580346

2. John E. McMurry: Organic Chemistry, Edition: 9TH 16, Copyright: 2016, Publisher: Cengage Learning, Published: 2016, ISBN-13: 978-1305080485; ISBN-10: 1305080483

3. David R. Klein: Organic Chemistry, 2015, Wiley, Edition: 2nd, ISBN: Main edition: 978-1-118-45228-8; Binder version: 978-1-118-45431-2

Title of the course: **Analytical chemistry**	***NEPTUN-code:*** RKXAK1ABNE	***Weekly teaching hours:*** *l+cw+lb* 1+0+2	***Credit*****:** 3 ***Exam type****:* tm
Course leader: Ágnes Bálint-Mészáros, Dr.	***Position:*** associate professor	***Required preliminary knowledge:*** RMXCA2KBNE	

Curriculum:

Subject of the analytical chemistry and its role in environmental protection. Qualitative analysis (cations, anions). Basics of volumetric analysis (titrimetric methods) and areas of application (acid-base, precipitation titrating, redox titration, conductometry etc). The enrichment and separation of trace substances principles various environmental media (liquid-liquid extraction, solid phase, microwave digestion, absorption pipes, evaporation, centrifugation, etc.). Fundamentals and types of chromatography (gas chromatography, liquid chromatography, ion chromatography, capillary electrophoresis ash etc). The principle and types of Molecular spectroscopy (UV-visible, infrared, fluorescence-, mass spectroscopy, etc.). Principle and types of Atomic spectroscopy (atomic absorption-, ICP, X-ray fluorescence spectroscopy etc). Confidence of different analytical methods, validation, standardization.

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection.
In possession of state-of-the-art IT skills, being able to use professional databases and certain design, modelling, and simulation software depending on their specialty.
Knowledge of the learning, knowledge acquisition, and data collection methods of the special fields of environment protection, their ethical limitations and problem solving techniques.
Comprehensive knowledge of the basic features and interrelations of environmental elements and systems, as well as of the environmentally harmful substances affecting them.
Knowledge of the methodology and legal regulations for performing environmental impact assessments and for compiling impact studies.
Able to perform basic tests of the quantity and quality characteristics of environmental elements and systems by state-of-the-art measuring instruments; to draw up and implement measurement plans; and to evaluate data.
Able to solve tasks of water, soil, air, radiation, and noise protection, as well as of waste treatment and processing at proposal level; to participate in preparing decisions; to perform authority audits; and to take part in the operation of these technologies.
Able to perform environmental impact assessments and to participate in compiling impact studies.
Able to apply in practice as well the regulations and requirements of health and safety, fire protection, and safety engineering as related to their special field.

Literature:

1. David Harvey: Modern Analytical Chemistry, McGraw Hill, Boston Burr Ridge, IL Dubuque, IA Madison, WI New York, San Francisco, St. Louis, Bangkok, Bogotá Caracas, Lisbon, London, Madrid, Mexico City, Milan, New Delhi, Seoul, Singapore, Sydney, Taipei, Toronto, 2000

2. Gary D. Christian: Analytical Chemistry, John Wiley and Sons Inc., 2004

3. Edited by Ira S. Krull: Analytical Chemistry, ISBN 978-953-51-0837-5, 154 pages, Publisher: InTech, Chapters published November 07, 2012 under CC BY 3.0 license DOI: 10.5772/3086
Comment:

Title of the course: **Physics I.**	***NEPTUN-code:*** RKXFI1ABNE	***Weekly teaching hours:*** *l+cw+lb* 1+1+0	***Credit*****:** 3 ***Exam type****:* tm
Course leader: Sándor Pekker, Dr.	***Position:*** research professor	***Required preliminary knowledge:*** There is no requirement	

Curriculum:

Dividing of physics. Physical quantities. Optics (light reflection and refraction, optical devices). Mechanics of liquids and gases (hydrostatic pressure, Archimedes' principle, equation of continuity, Bernoulli's equation). Basics of acoustics (speed of sounds, sound intensity level, Doppler effect, Mach number). Basics of relativistic physics, Einstein's special theory of relativity (velocity transformation, increase of mass, mass-energy relationship). Thermodynamics. Thermal expansion of solids and liquids. State equation of ideal gases, special changes of state and their description. Heat. Laws of thermodynamics. Special processes. Thermal conduction. Heat engines.

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection.
Able to participate creatively in engineering work based on their multidisciplinary skills, as well as to adapt to continuously changing circumstances.
Open to professional cooperation with specialists related to their profession but involved in other areas.
Efforts to improve knowledge by on-going self-education and continuously update their knowledge of the world.

Literature:

1. Serway Jewett: Physics for Scientist and Engineers
2. Lóránt Szabó: Physics for Undergraduate Students
3. www.physicsslassroom.com
4. Bueche, F., Hecht, E.: Schaum's Outline of College Physics, 11th edition, McGraw-Hill Education, 2011.
5. Feynman R., Leighton, R.B. and Sands M.: The Feynman Lectures on Physics. Volumes I., II. Revised and extended edition, Addison-Wesley, 2005.
6. Fleisch, D., Kinnaman, L.: A Student's Guide to Waves, Cambridge University Press, 2015.
7. Shankar, R.: Fundamentals of Physics: Mechanics, Relativity, and Thermodynamics. Yale University Press, 2014.

Title of the course: **Physics II.**	***NEPTUN-code:*** RKXFI2ABNE	***Weekly teaching hours:*** *l+cw+lb* 1+1+0	***Credit*****:** 3 ***Exam type****:* e
Course leader: Sándor Pekker, Dr.	***Position:*** research professor	***Required preliminary knowledge:*** RKXFI1ABNE	

Curriculum:

Dividing of physics II. Laws of thermodynamics. Special processes. Molecular heat theory. Thermal propagation. Heat engines (Carnot, Otto and Diesel). Basics of electrodynamics. Charges at rest. Moving charges. Alternating and direct current. Maxwell's equations. Introduction to atom physics: basic concepts of quantum mechanics. Photoelectric effect. Uncertainty relation. Nuclear physics: Bohr's atomic mode. The structure of the atomic nucleus. Relationship between mass defect and binding energy. The mechanism of atomic fission. The operating principle of nuclear power plants. Radioactive decays and their lawfulness.

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection.
Able to participate creatively in engineering work based on their multidisciplinary skills, as well as to adapt to continuously changing circumstances.
Open to professional cooperation with specialists related to their profession but involved in other areas.
Efforts to improve knowledge by on-going self-education and continuously update their knowledge of the world.

Literature

1. Serway Jewett: Physics for Scientist and Engineers
2. Lóránt Szabó: Physics for Undergraduate Students
3. www.physicsslassroom.com
4. Bueche, F., Hecht, E.: Schaum's Outline of College Physics, 11th edition, McGraw-Hill Education, 2011.
5. Feynman R., Leighton, R.B. and Sands M.: The Feynman Lectures on Physics. Volumes I-III. Revised and extended edition, Addison-Wesley, 2005.
6. Shankar, R.: Fundamentals of Physics: Mechanics, Relativity, and Thermodynamics. Yale University Press, 2014.
7. Shankar, R.: Fundamentals of Physics II: Electromagnetism, Optics, and Quantum Mechanics. Yale University Press, 2016.

Comment:

Title of the course: Biology I.	***NEPTUN-code:*** RKXBI1EBNE	***Weekly teaching hours:*** *l+cw+lb* 2+1+0	***Credit*****:** 4 ***Exam type****:* tm
Course leader: Hosam Bayoumi, Dr.	***Position:*** university private professor, associate professor	***Required preliminary knowledge:*** None	

Curriculum:

What is life? Fundamental of biology: life science. Organization levels of life. Characteristics of living organisms. Modern and molecular biology. Biopolymers in living organisms: carbohydrates, lipids, protein, and nucleic acids. Basics of classification of living organisms. Cell Biology: Cell definition, structures and functions. Homeostasis and cell transport. Photosynthesis: Definition, chloroplast structure and function, structure and function of photosystems. Cellular respiration: Biochemical reactions and enzymes, Catabolic and anabolic pathways. Adenosine triphosphate: Chemiosmosis, synthesis and production. Cellular reproduction: Cell cycle, Cell division (mitosis and meiosis). Fundamentals of molecular genetics, DNA, RNA and protein synthesis, gene expression: Chromosome and gene structure and function, inheritance patterns and human genetics, gene technology (DNA technology, human genome projects, genetic engineering). DNA replication. Types of RNA and protein synthesis: Transcription, translation and gene control. Mutation: types, prevalence and significance. Plasmids: their role and adaptation. Microorganisms, protists and fungi. Bacteria (Characteristics and classification, non-cell wall bacteria, cyanobacteria and archaea, bacterial size and shape, and roles of bacterial activities in the environment and industry). Viruses (Characteristics, structure and classification). Characteristics and classification of Protista. Plant and animal-like protists. Protists and human. Biology of algae and roles of algae in the environment. Fungi: Characteristics and classification and their importance in nature and industry. Microbial cultivation and growth: Physical and chemical growth requirements, cultivation and isolation techniques. Microbial growth and reproduction: Growth curve, reproduction patterns and microbial measurements. Control of microbial growth: Physical and chemical methods. Antibiotics, mode of action, antimicrobial drugs and drug resistance. Microbial Ecology: energy transfer and ecosystem management, microbe-microbe, microbe-plant and microbe-animal interactions.

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection

Knowledge of the learning, knowledge acquisition, and data collection methods of the special fields of environment protection, their ethical limitations and problem solving techniques.

Comprehensive knowledge of the basic features and interrelations of environmental elements and systems, as well as of the environmentally harmful substances affecting them.

Able to cooperate with engineers involved in the development and application of production and other technologies to develop the given technology in terms of environment protection.

Able to participate creatively in engineering work based on their multidisciplinary skills, as well as to adapt to continuously changing circumstances.

Collaboration with civil organizations engaged in environment protection, but willing to argue in order to develop optimal solutions.

Constantly upgrading their knowledge of environment protection by attending organized professional development training courses.

Sharing experiences with colleagues, thus promoting their development.

Taking responsibility towards society for their decisions made in the scope of environment protection.
Literature:
• Lecture's notice and PPT
• Richard Hunt et al. (2011): Microbiology and Immunology On-line. The Board of Trustees of the University of South Carolina
• J.H. Postlethwait and J.L. Hopson (2009): Modern Biology. Holt, Rinehart and Winston. A Harcourt Education Company, New York, London. ISBN-13: 978-0-03-006769-4
• Kenneth Todar (2008): Todar's Online Textbook of Bacteriology. University of Wisconsin
• David M. Sander (2007): Big Picture Book of Viruses.
• Julie B. Wolf (2005): Applied Molecular Biology. Beginning Laboratory Manual. University of Maryland, Baltimore County (UMBC).
• T. A. Brown (2002): Genomes 2nd edition Bios Scientific Publishers Ltd IBSN: 9781859962282
• Harry L. T. Mobley, George L. Mendz, Stuart L. Hazell (2001): Helicobacter pylori: Physiology and Genetics. ASM Press ISBN: 9781555812133
• Madigan, Martinko and Parker (2000): Biology of Microorganisms. 8th edition Southern Illinois University, Carbondale
Comment: Attendance of lectures is compulsory! Examination requirements: It is not allowed to be absence more than 4 lectures. 2 midterms with at least a pass grade (50-64 = 2%). Requirements to pass the course: Two written exams. Solve the Homework and write an assay. Term marks: 85-100%: excellent (5), 75-84%: good (4), 65-74%: satisfactory (3), 50-64%: pass (2), 0-49%: fail (1).

Title of the course: ***Biology II.***	***NEPTUN-code:*** RKXBI2EBNE	***Weekly teaching hours:*** *l+cw+lb* 2+1+0	***Credit*****:** 4 ***Exam type****:* e
Course leader: Hosam Bayoumi, Dr.	***Position:*** university private professor, associate professor	***Required preliminary knowledge:*** RKXBI1EBNE	

Curriculum:

Evolution: History of life, Theory evolution, Populations genetics and speciation, Classification of living organisms (biodiversity, systematics and modern classification). Importance of plants. Plant evolution and classification. Plant structures and functions. Plant reproduction and plant responses. Importance of plants. Plant evolution and classification. Plant structures and functions. Plant reproduction and plant responses. Invertebrates: Introduction to animals, Sponges, Cnidarians, and Ctenophores. Flatworms, Roundworms, and Rotifers. Molluscs and Annelids, Arthropods, Insects, Echinoderms and invertebrate chordates. Vertebrates: Fishes, Amphibians, Reptiles, Birds, Mammals and animal behaviour. Human Biology: Skeletal, Muscular and skin systems, blood and respiratory systems, The body's defense systems, Digestive and Excretory systems, Nervous system and sense organs, Endocrine system, Reproductive system. The main types of multicellular plant organization. The practical useful of animal and fungi regarding to recognize the environmental protection especially the important indicator groups. The living organization systems and the relationship between awareness of environmental factors, their roles in the regulation of life-operations systems, as well as behaviour of living systems for understanding of the operation.

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection

Knowledge of the learning, knowledge acquisition, and data collection methods of the special fields of environment protection, their ethical limitations and problem solving techniques.

Comprehensive knowledge of the basic features and interrelations of environmental elements and systems, as well as of the environmentally harmful substances affecting them.

Able to cooperate with engineers involved in the development and application of production and other technologies to develop the given technology in terms of environment protection.

Able to participate creatively in engineering work based on their multidisciplinary skills, as well as to adapt to continuously changing circumstances.

Collaboration with civil organizations engaged in environment protection, but willing to argue in order to develop optimal solutions.

Constantly upgrading their knowledge of environment protection by attending organized professional development training courses.

Sharing experiences with colleagues, thus promoting their development.

Taking responsibility towards society for their decisions made in the scope of environment protection.

Literature:

PowerPoint presentation of lectures

"Branches of Biology". Biology-online.org. Retrieved 2013-10-02.

Life Science, Weber State Museum of Natural Science". Community.weber.edu. Retrieved 2013-10-02

Hörandl, Elvira (2013). Meiosis and the Paradox of Sex in Nature, Meiosis, Dr. Carol Bernstein (Ed.), ISBN 978-953-51-1197-9, InTech, doi:10.5772/56542

Jane B. Reece and Lisa A. Urry (2013). Campbell Biology (10th Edition)

McNeill, J.; Barrie, F.R.; Buck, W.R.; Demoulin, V.; Greuter, W.; Hawksworth, D.L.; Herendeen, P.S.; Knapp, S.; Marhold, K.; Prado, J.; Prud'homme Van Reine, W.F.; Smith, G.F.; Wiersema, J.H.; Turland, N.J. (2012). International Code of Nomenclature for algae, fungi, and plants (Melbourne Code) adopted by the Eighteenth International Botanical Congress Melbourne, Australia, July 2011. Regnum Vegetabile 154. A.R.G. Gantner Verlag KG. ISBN 978-3-87429-425-6. Recommendation 60F

Bartsch, John and Colvard, Mary P. (2009) The Living Environment. New York State Prentice Hall. ISBN 0133612023.

Larson, Edward J. (2006). "Ch. 3". Evolution: The Remarkable History of a Scientific Theory. Random House Publishing Group. ISBN 978-1-58836-538-5.

Fields S, Johnston M (2005). "Cell biology. Whither model organism research?". Science 307 (5717): 1885–6. doi:10.1126/science.1108872

Judd, W.S. et al. 2002: Plant systematics: a phylogenetic approach. Sinauer Associates Inc.

Comment: Attendance of lectures is compulsory! Examination requirements: It is not allowed to be absence more than 4 lectures. 2 midterms with at least a pass grade (50-64 = 2%). Requirements to pass the course: Two written exams. Solve the Homework and write an assay and to pass the oral examination.

Title of the course: **Electrotechnics**	***NEPTUN-code:*** RKXEL1EBNE	***Weekly teaching hours:*** *l+cw+lb* 2+1+0	***Credit*****:** 4 ***Exam type****:* tm
Course leader: Sándor Pekker, Dr.	***Position:*** research professor	***Required preliminary knowledge:*** There is no requirement	

Curriculum:

Production and features single-phase alternating current. Peak and RMS value. The coil and the capacitor AC circuit. RLC circuits. AC power, power factor correction. Production of three-phase voltage. Three-phase networks. Star and delta. Transformers operating principle, equivalent circuit, operating conditions. The transformer structure. Special transformers. The basics of electronics. Semiconductor devices. The diode characteristics, application areas. Rectifier circuits. Special properties diodes. Power supplies. The thyristor, triac and diac structure, characteristic curves and application areas. Transistors construction, operation, characteristic curves. Amplifier basic circuits. The transistor switching operation. Amplifier circuit features. Operational Amplifiers construction, operation modes. Oscillators. Multi Plate. Operating principles, structure, replacing the coupling of the asynchronous machine. The single-phase asynchronous motor. Operating principle, starting torque and asynchronous machines. Principle of operation of DC machines, excitation solutions and operational features.

Professional competencies:

In possession of state-of-the-art IT skills, being able to use professional databases and certain design, modelling, and simulation software depending on their specialty.
Efforts to improve knowledge by on-going self-education and continuously update their knowledge of the world.
Responsible proclamation and representation of the value system of the engineering profession; openness to professionally well-founded critical remarks.
Sharing experiences with colleagues, thus promoting their development.

Literature:

1. Valery Vodovozov: Introduction of to Electronic Engineering, 2010. http://bookboon.com; ISBN: 978-87-7681-539-4

2. Don Johnson: Fundamentals of Electrical Engineering I, Connexions , 2010; https://cnx.org/contents/d442r0wh@9.72:g9deOnx5@19/Themes; 1999-2018, Rice University; ID: 778e36af-4c21-4ef7-9c02-dae860eb7d14@9.72

3. John A. I. E. E. Henderson: ELECTROTECHNICS, WENTWORTH Press, 2016. aug. 25. - 188 pages, ISBN: 1362012750, 9781362012757

Title of the course: **Ecology**	***NEPTUN-code:*** RKXOK1ABNE	***Weekly teaching hours:*** *l+cw+lb* 2+1+0	***Credit*****:** 4 ***Exam type****:* e
Course leader: Hosam Bayoumi, Dr.	***Position:*** university private professor, associate professor	***Required preliminary knowledge:*** RKXBI2EBNE	

Curriculum:

The ecological concepts and principles (environmental tolerance, and indications limitation, examples of the general principle indicator principle, the principle of general indication, the complementation principle;. Multiplurális the environmental principle). Ecology, biology subject of continually, the organization above the individual units and scales: the organization over individual units); levels of biological organization, particularly with regard to the supra-organizational levels, definitions and characterizations. The interaction between man and nature, biological and cultural coevolution of biological complementarity of capacity and mediation systems. The population of the association and community life, the biome and biosphere. The concepts behind and plant populations; properties and structures; Ecology of clonal herbs. Uniformity of globalization, identifying global problems, search for solutions; the need for sustainable livelihoods and opportunities, diversifying globalization. The competition and Herbivorian, their role in the regulation of communities; intra- and interspecific competition, competitive exclusion and stable coexistence; a niche subdivision and segregation plant associations. Theories Association: Clements - Gleason core hypotheses. Plant community structure (the space-time structure, the main reasons for their formation); and textures (floral elements, cönotype, etc.); diversity, diversity indices; diversity maintenance mechanisms. The interpretation of the environment and nature protection; the environment and tolerance: the relationship between population and environment; based on the turnover. The concept of primary production, distribution of the earth; primary productivity and energy utilization producers, the primary level; the trophic structure of food chains and webs; material and energy flows, on biogeochemical cycles; limiting the production of primary environmental factors: light, heat, water, CO_2, nutrients. Communities change in time, the main succession types: a secular, primary, secondary, biotic, ecogenetic and plant cover; a niche subdivision changes during succession; Basics of the island biogeography, ecological isolates; stability. The main indicator of ecosystem status, the system is interpreted as characteristics of organisms communities. The biosphere and its history; The concept of biodiversity, importance, need for protection; Gaia Hypothesis; Change the associations and global biogeochemical cycles and their consequences; The history of human nature conversion activities; the world food problem; fresh water shortages; the growth of the world population problem; world economic growth, economic globalization; environmental technologies, environmental protection.

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection

Knowledge of the learning, knowledge acquisition, and data collection methods of the special fields of environment protection, their ethical limitations and problem solving techniques.

Comprehensive knowledge of the basic features and interrelations of environmental elements and systems, as well as of the environmentally harmful substances affecting them.

Able to cooperate with engineers involved in the development and application of production and other technologies to develop the given technology in terms of environment protection. Able to participate creatively in engineering work based on their multidisciplinary skills, as well as to adapt to continuously changing circumstances. Collaboration with civil organizations engaged in environment protection, but willing to argue in order to develop optimal solutions. Constantly upgrading their knowledge of environment protection by attending organized professional development training courses. Sharing experiences with colleagues, thus promoting their development. Taking responsibility towards society for their decisions made in the scope of environment protection**.**
Literature:
Lectures PPT
Townsend, C.R., Begon, M., Harper, J.L. (2006). Essentials of Ecology (2nd Edition). Blackwell Publishing. (Highly recommended).
Begon, M., Townsend, C. R., Harper, J. L. (2006). Ecology (4th edn).
Towsend, C.R., Begon, M., Harper, J. (2003): Essentials of Ecology. 2nd ed. Blackwell Science, Oxford.
Press, M.C., Huntly, N.J., Levin, S. (2001): Ecology: Achievement and challenge. Blackwell Science, Oxford.
Crawley, M. J. (1997): Plant ecology. 2nd ed. Blackwell Science, Oxford.
Begon M., Harper J.L., Townsend C.R. (1996): Ecology. Blackwell Science
Krebs, C. J. (1994 & 2001). Ecology. (4^{th} & 5^{th} edns). Harper Collins, New York.
Comment: Attendance of lectures is compulsory! Examination requirements: It is not allowed to be absence more than 4 lectures. 2 midterms with at least a pass grade (50-64 = 2%). Requirements to pass the course: Two written exams. Solve the Homework and write an assay and to pass the oral examination.

Title of the course: **Earth sciences knowledge**	***NEPTUN-code:*** RKXFT1ABNE	***Weekly teaching hours:*** *l+cw+lb* 2+0+2	***Credit*****:** 4 ***Exam type****:* tm
Course leader: Krisztina Demény Dr.	***Position:*** senior lecturer	***Required preliminary knowledge:*** -	

Curriculum:

The geological history of the Earth. The internal structure of the Earth (the crust, the mantle, the core). Volcanism (type of volcanoes, volcanoes and plate boundaries) and plate tectonics. Rocks (igneous, sedimentary and metamorphic) and minerals classification systems. Major types of landforms (plains, mountains, cratons). Exogenous processes and main landform methods (the work of rivers, the formation of shores and coastlines, glacial processes, the work of wind). Main features of surface waters (rivers and lakes) and waters below the surface (groundwater, confined water, crack water). Karst processes (karst forms on or below the surface). Main soil types in the world (definition, functions, and major soil formations).

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection

Comprehensive knowledge of the basic features and interrelations of environmental elements and systems, as well as of the environmentally harmful substances affecting them.

Able to perform basic tests of the quantity and quality characteristics of environmental elements and systems by state-of-the-art measuring instruments; to draw up and implement measurement plans; and to evaluate data.

Open to professional cooperation with specialists related to their profession but involved in other areas.

Literature:

1. William M. Marsh, Martin M. Kaufman: Physical geography, Cambridge University Press, 2013.

2. PPT files on the homepage of Moodle learning system

Comment:

Title of the course: **Environmental studies**	***NEPTUN-code:*** RKXKT1ABNE	***Weekly teaching hours:*** *l+cw+lb* 2+0+0	***Credit*****:** 3 ***Exam type****:* e
Course leader: Konrád Lájer, Dr.	***Position:*** associate professor	***Required preliminary knowledge:*** -	

Curriculum:

The purpose of the course in environmental engineer training is to review the basic knowledge about elements of environmental system, the basic environmental concepts, to disclose antropogenous effects those influence unfavourable way the state of environment. Reviewing basic principles which can be used for diminishing unfavourable effects that influence environmental systems, to familiarize requirements that are necessary in favour of sustainability. Types of environmental harms, the process of contamination. Causes of global issues, their effects and possibilities of reducing. Means which are used for enhancing the effectiveness of environmental protection: ecological footprint calculation, lifecycle analysing, eco-label. Characterize biotic and abiotic factors of ecological system, importance of biological-geochemical cycles research. Features, harms and protection of atmosphere, hydrosphere and lithosphere. Specific effects of noise and vibration caused by human activities and its alleviating possibilities. Reviewing elements of waste management pyramid. Application effects of different types of energy sources.

Professional competencies:

Comprehensive knowledge of the basic features and interrelations of environmental elements and systems, as well as of the environmentally harmful substances affecting them. Knowledge of the basics of energy management, options for energy production, their advantages and disadvantages, as well as the concept and feasibility options of sustainable development.
Able to participate creatively in engineering work based on their multidisciplinary skills, as well as to adapt to continuously changing circumstances.
Efforts to improve knowledge by on-going self-education and continuously update their knowledge of the world.

Literature:

1. Visualizing Environmental Science, 4th 2014, Wiley

2. PPS file sin Moodle and recommended literature sources

Comments:

Economic and human knowledge (10-30cr.):

Title of the course: **Macroeconomics**	***NEPTUN-code:*** GGXKG1QBNE	***Weekly teaching hours:*** *l+cw+lb* 2+0+0	***Credit*****:** 2 ***Exam type****:* tm
Course leader: András Medve, Dr.	***Position:*** associate professor	***Required preliminary knowledge:*** -	
Curriculum:			
Introduction to Macroeconomics and National Income Accounting. The MPS and the SNA-system. Gross Output, GDP, GNI, NDP, Nni, GNDI, NNDI. The Determination of National Income. The Circular Flow. The Consumption Function. The Investment Demand. Money and Modern Banking. Money and its Functions. The Monetary Base and the Money Multiplier. Commercial Banks and the Central Bank. Equilibrium in the Financial Markets. Money and Inflation. The Cost of Inflation. The Government in the Circular Flow. The Government Budget. Monetary and Fiscal Policy. Lorenz Curve and the Gini Coefficient. Economic Growth and the Business Cycle. International trade and Commercial Policy. Absolute and Comparative Advantage in the World Trade. The Components of the Balance of Payments			
Professional competencies:			
Knowledge of the concepts and tools of economics and environmental economics, project and environment management in environment protection. Able to perform public administrative and authority tasks related to environment protection after getting acquainted with the duty assigned to them. Undertaking and authentically representing the social role of environment protection, its basic relationship with the world. Efforts to improve knowledge by on-going self-education and continuously update their knowledge of the world. Responsible proclamation and representation of the value system of the engineering profession; openness to professionally well-founded critical remarks.			
Literature:			
1. Begg, David et al. Economics. McGraw-Hill Edition, 2014. 2. Peter Jochumzen: Essentials of Macroeconomics. 2010. www.bookboon.com 3. Ian Jaques: Mathematics for Economics and Business, Addison-Wesley			

Title of the course: **Microeconomics**	***NEPTUN-code:*** GGXKG2QBNE	***Weekly teaching hours:*** *l+cw+lb* 1+1+0	***Credit*****:** 2 ***Exam type****:* tm
Course leader: András Medve, Dr.	***Position:*** associate professor	***Required preliminary knowledge:*** -	

Curriculum:

The Tools Of Economic Analysis. The Market. Demand, Supply and Equilibrium. Free Markets and Price Controlls: Price Ceilings and Maximum Prices. Price Elasticity Of Demand, Cross-elasticity of demand, Income-elasticity.The Theory Of Consumer Choice. Complements and Substituties. Business Organization and Behaviour. The Firms Production Decision. Production costs.Type of Business Organizations. Market Structures and Mesurement of Market Power: Herfindahl, CR and Lerner-index. Perfect Competition and Pure Monopoly. Monopolistic Competition. Oligopoly. Game-theory.and interdependent Decision. Nash- Equilibrium. Dominant Equilibrium. The Analysis of Factor Markets: Labour Market. Human Capital. Capital Markets. Rentals, Interest Rates and Assets Prices. Net Present Value.

Professional competencies:

Knowledge of the concepts and tools of economics and environmental economics, project and environment management in environment protection.
Able to participate in project and proposal implementation and audit tasks based on their knowledge.
Undertaking and authentically representing the social role of environment protection, its basic relationship with the world.
Efforts to improve knowledge by on-going self-education and continuously update their knowledge of the world.
Responsible proclamation and representation of the value system of the engineering profession; openness to professionally well-founded critical remarks.

Literature:

1. Begg, David et al. Economics. McGraw-Hill Edition, 2014.
2. Peter Jochumzen: Essentials of Macroeconomics. 2010. www.bookboon.com
3. Ian Jaques: Mathematics for Economics and Business, Addison-Wesley

Title of the course: **Enterprise Economics**	***NEPTUN-code:*** GSEVG2QBNE	***Weekly teaching hours:*** *l+cw+lb* 2+2+0	***Credit*****:** 4 ***Exam type****:* e
Course leader: Péter Szikora Dr.	***Position:*** senior lecturer	***Required preliminary knowledge:*** -	

Curriculum:

The aim of the course is for students to acquire knowledge which will enable them to deal with economic and financial problems from a corporate point of view. Students are introduced to the concepts of enterprise, objectives, business environment, business forms, value creation, production processes, organizational forms, strategy creation and corporate marketing. Students also gain an insight into the development of enterprises, different development strategies, problems of growing, optimal operational size and various other essential aspects of managing a corporation. Students are introduced into company asset management, labor management issues, cost management, cost accounting methodology, analysis of the economics of investments and the basics of corporate finance. Students also gain an insight into basic marketing concepts and methods.

Professional competencies:

Able to perform public administrative and authority tasks related to environment protection after getting acquainted with the duty assigned to them.
Able to take part in environment expertise, advisory, and decision preparation work.
Undertaking and authentically representing the social role of environment protection, its basic relationship with the world.
Open to professional cooperation with specialists related to their profession but involved in other areas.
Efforts to improve knowledge by on-going self-education and continuously update their knowledge of the world.
Responsible proclamation and representation of the value system of the engineering profession; openness to professionally well-founded critical remarks.
Taking responsibility towards society for their decisions made in the scope of environment protection.
Cooperation with qualified experts from other special areas (primarily economic and legal) in the course of completing professional tasks.

Literature:

1. Kadocsa, Gy. (2007): Entrepreneurial Management. Amicus Press, Budapest – München
2. Spinelli, S., Adams, R. (2011): New venture creation: Entrepreneurship for the 21st Century. McGraw-Hill Education

Title of the course: **Basics of Management**	***NEPTUN-code:*** GVXMA1QBNE	***Weekly teaching hours:*** *l+cw+lb* 1+1+0	***Credit*****:** 3 ***Exam type****:* e
Course leader: Bianka Parragh, Dr.	***Position:*** senior lecturer	***Required preliminary knowledge:*** -	

Curriculum:

Managament as a scientifical discipline (theories and waves). Content of the managerial activity, skills and tasks. Decision like the centre of the managerial activity. Decision theories. Relationship of the leader and employees. Leadership styles and typology of the leadership. The organizations, structures (organogram) and characteristics. The successfull and effective managers. Fields of management: strategical-, project-, innovation-, and marketing management, TQM. Envorinmentally friendly management. Deal and handle the problems, conflicts, crisis management. Goals for the Human Resource Management (recruitment and selection). Corporate culture and identity. Self management, communication skills, personality tests. Creation, creativity techniques. Case studies from the fields of decision, responsibilty, emotions, moral. Recruitment and selection, demontsration of a job interview.

Professional competencies:

Knowledge of the concepts and tools of economics and environmental economics, project and environment management in environment protection.
Able to participate in project and proposal implementation and audit tasks based on their knowledge.
Able to carry out management duties subject to sufficient professional experience.
Able to cooperate with engineers involved in the development and application of production and other technologies to develop the given technology in terms of environment protection.
Able to take part in environment expertise, advisory, and decision preparation work.
Collaboration with civil organizations engaged in environment protection, but willing to argue in order to develop optimal solutions.
Open to professional cooperation with specialists related to their profession but involved in other areas.
Efforts to improve knowledge by on-going self-education and continuously update their knowledge of the world.
Efforts to solve tasks and make management decisions by being aware of the opinions of the colleagues supervised, possibly in cooperation therewith.
Sharing experiences with colleagues, thus promoting their development.
Performing environmental tasks individually and managing special environment protection work independently even in unexpected decision making situations.

Literature:

Compulsory:

1. Dr. Bianka Parragh (2011): “Management” – digitally available textbook of theory and practice, Óbuda University, VMI
2. Montana P. J. – Charnov B. H. (2008): Management, Barron's Educational Series

Recommended:

3. Manfred Kets de Vries (2006): The leadership mystique – Leading behavior in the human enterprise, Prentice Hall
4.Derek Rowentree (2006): The manager’s checklists, Pearson Prentice Hall

Title of the course: **Project management**	***NEPTUN-code:*** RMEPR1KBNE	***Weekly teaching hours:*** *l+cw+lb* 1+1+0	***Credit*****:** 2 ***Exam type****:* e
Course leader: Áron Takács Dr.	***Position:*** associate professor	***Required preliminary knowledge:*** -	

Curriculum:

Fundamentals of management science (trends and theories). The characterization of management activity, skills and tasks. Decision-making as the core activity of the managerial work. Decision theory. The realationship between leader and subordinate. Leadership styles and leadership theory. Organizational forms, organigrams, structures and their characterization. Discipline of management: strategy management, project management, innovation management and marketing management, TQM. Environmentally conscious management. Problem and conflict solving, crisis and conflict management. The objective of human resource management (selection and recruitment). Organizational culture and identity. Self-management, communication styles, personality traits (tests). Creativity-inspiring techniques. Case studies in the matters of decision, responsibility, power and authority. Recruitment and selection, job interview situational practice.

Professional competencies:

Knowledge of the concepts and tools of economics and environmental economics, project and environment management in environment protection.
Able to participate in project and proposal implementation and audit tasks based on their knowledge.
Able to carry out management duties subject to sufficient professional experience.
Able to cooperate with engineers involved in the development and application of production and other technologies to develop the given technology in terms of environment protection.
Able to take part in environment expertise, advisory, and decision preparation work.
Collaboration with civil organizations engaged in environment protection, but willing to argue in order to develop optimal solutions.
Open to professional cooperation with specialists related to their profession but involved in other areas.
Efforts to improve knowledge by on-going self-education and continuously update their knowledge of the world.
Efforts to solve tasks and make management decisions by being aware of the opinions of the colleagues supervised, possibly in cooperation therewith.
Sharing experiences with colleagues, thus promoting their development.
Performing environmental tasks individually and managing special environment protection work independently even in unexpected decision making situations.

Literature:

1. A Guide to the Project Management Body of Knowledge, Project Management Institute, 1996 - 176 pp.
2. 2. Project management guide (PMBOK® Guide) 5. Akadémiai Kiadó, Budapest, 2013, ISBN: 978 963 05 9426 4
PPT files on the homepage of Moodle learning system

Environmental elements protection (30-70cr.):

Title of the course: **Environmental elements protection I. - Water quality protection**	***NEPTUN-code:*** RKXKE1ABNE	***Weekly teaching hours:*** *lecture+practical work+lab work* 1+2+0	***Credit:*** 3 ***Exam type****:* tm
Course leader: Rita Kendrovics-Boda, Dr.	***Position:*** associate professor	***Required preliminary knowledge (with code too):*** -	
Curriculum:			
Course objective is to provide overall knowledge about topics of water quality protection and water management. Within this scope it deals in details with water circulation in the nature and in the society and with water incidences available for residential utilization. It examines impacts and impurities affecting natural waters of the industrializing world and water quality resulting from that, together with monitoring possibilities. It reviews general questions of water and water management, like basics of water management, fundamentals of water resources management, current and future water demands. It shows different types of water utilization and the return options of used waters to the nature. It presents basic hydrological notions, transmission of impurities in surface and subsurface waters, as well as impacts of oil pollution to water quality and possibilities of environmental clean-up.			
Professional competencies:			
Comprehensive knowledge of the basic features and interrelations of environmental elements and systems, as well as of the environmentally harmful substances affecting them. Knowledge of the main methods to examine the quantity and quality features of environmental elements and systems, their typical measuring instruments and limitations thereof, as well as methods for the evaluation of data measured. Able to perform basic tests of the quantity and quality characteristics of environmental elements and systems by state-of-the-art measuring instruments; to draw up and implement measurement plans; and to evaluate data. Able to solve tasks of water, soil, air, radiation, and noise protection, as well as of waste treatment and processing at proposal level; to participate in preparing decisions; to perform authority audits; and to take part in the operation of these technologies. Able to carry out assignments as environmental officer. Able to carry out management duties subject to sufficient professional experience.			
Literature:			
Dr. Pregun, Csaba: Hydrology, Publication date 2011, Szerzői jog © 2011 Debreceni Egyetem. Agrár- és Gazdálkodástudományok Centruma, in e-learning system			
R.C.Gaur: Basic environmental engineering, New Age International Publishers. 2008 in e-learning system			

Title of the course: **Environmental elements protection II. - Air quality protection**	***NEPTUN-code:*** RKXKE2ABNE	***Weekly teaching hours:*** *l+cw+lb* 1+2+0	***Credit*****:** 3 ***Exam type****:* tm
Course leader: Rita Kendrovics-Boda, Dr.	***Position:*** associate professor	***Required preliminary knowledge:*** There is no requirement	

Curriculum:

Topics: Structure of atmosphere, ambience effects, sunlight radiation, greenhouse effect, the spread of pollutants, self-purification, air quality protection limit values, imission emission standards. Dust technical basic concepts, methods of measurement, dust chambers, filters, cyclones, electro filters.

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection.
In possession of state-of-the-art IT skills, being able to use professional databases and certain design, modelling, and simulation software depending on their specialty.
Comprehensive knowledge of the basic features and interrelations of environmental elements and systems, as well as of the environmentally harmful substances affecting them.
Able to perform basic tests of the quantity and quality characteristics of environmental elements and systems by state-of-the-art measuring instruments; to draw up and implement measurement plans; and to evaluate data.
Able to carry out assignments as environmental officer.
Able to carry out management duties subject to sufficient professional experience.
Constantly upgrading their knowledge of environment protection by attending organized professional development training courses.

Literature:

1. Nicholas P. Cheremisinoff, Ph.D. : Handbook of Air Pollution Prevention and Control
2. Margeret Pence - Handbook of Air Pollution control Systems and Devices
3. Roy M. Harrison - Handbook of Air Pollution Analysis 2 Sub Edition
4. Joel M. Haight Ph.D., P.E. - Control of Air Pollution

Comment:

Title of the course: **Environmental elements protection III. - Soil protection**	*NEPTUN-code:* RKXKE3ABNE	*Weekly teaching hours: l+cw+lb* 2+0+2	***Credit*:** 4 ***Exam type**:* tm
Course leader: Rita Kendrovics-Boda, Dr.	*Position:* associate professor	*Required preliminary knowledge:* RKXFT1ABNE	

Curriculum:

The aims of this course to present the basic knowledge of the soil - soil concept, features, soil forming materials, physical properties of soil, soil nutrient supply, soil classification. It summarizes the analysis of soil degradation processes and the impacts of human activities on soil quality within the soil conservation process. It provides comprehensive knowledge about soil organic and inorganic pollutants, their effects and the factors determining the spread of contamination. It presents the various remediation technologies and opportunities for remediation of contaminated sites and international experience. A particular lecture is devoted to on-site (in-situ, ex-situ) and off-site procedures. Furthermore, a special lecture deals with the various polluting substances and their detection and termination.

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection.
Comprehensive knowledge of the basic features and interrelations of environmental elements and systems, as well as of the environmentally harmful substances affecting them.
Knowledge of the main methods to examine the quantity and quality features of environmental elements and systems, their typical measuring instruments and limitations thereof, as well as methods for the evaluation of data measured.
Knowledge of the methodology and legal regulations for performing environmental impact assessments and for compiling impact studies.
Able to solve tasks of water, soil, air, radiation, and noise protection, as well as of waste treatment and processing at proposal level; to participate in preparing decisions; to perform authority audits; and to take part in the operation of these technologies.
Able to apply environmental remediation methods, to prepare for and participate in remediation.
Able to carry out assignments as environmental officer.
Able to take part in environment expertise, advisory, and decision preparation work.
Constantly upgrading their knowledge of environment protection by attending organized professional development training courses.

Literature:

1. RPC Morgan: Soil Erosion and Conservation, National Soil Resources Institute, Cranfield University, Blackwell Publishing, 2005,
2. Humberto Blanco, Rattan Lal: Principles of Soil Conservation and Management, Springer Verlag, 2008

Comment:

Title of the course: **Environmental hazards I. - Noise and Vibration Protection**	*NEPTUN-code:* RKXKA1ABNE	*Weekly teaching hours: l+cw+lb* 2+1+0	***Credit*:** 3 ***Exam type**:* tm
Course leader: Konrád Lájer, Dr.	*Position:* associate professor	*Required preliminary knowledge:* There is no requirement	

Curriculum:

The study of this subject can be divided into two main parts:

1. **noise**, noise pollution and effect on human, physical describing of sound waves, sound levels (SWL, SPL, SIL) loudness and frequency (Fletcher-Munson curves), noise reduction methods, noise filters, noise measurement and calculation, noise map. Noise protection at the source, transmission path and receiver.
2. **vibration**, vibration pollution, modelling of vibration (free and damped), levels in decibels (acceleration, velocity, displacement), forced oscillations, resonance frequency (Tacoma Narrows Bridge), effects of vibration on human depend on many factors, whole body and hand-arm vibrations, vibration absorption,vibration measurement. Vibration insulation and damping.

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection.

Able to solve tasks of water, soil, air, radiation, and noise protection, as well as of waste treatment and processing at proposal level; to participate in preparing decisions; to perform authority audits; and to take part in the operation of these technologies.

Able to communicate both verbally and in writing in their mother tongue and in at least one foreign language, in respect of professional issues, and to continuously develop their professional skills as required.

Able to carry out assignments as environmental officer.

Open to professional cooperation with specialists related to their profession but involved in other areas.

Efforts to improve knowledge by on-going self-education and continuously update their knowledge of the world.

Constantly upgrading their knowledge of environment protection by attending organized professional development training courses.

Responsible proclamation and representation of the value system of the engineering profession; openness to professionally well-founded critical remarks.

Literature:

1. Serway Jewett: Physics for Scientist and Engineers

2. http://www.bvsde.paho.org/bvsacd/cd53/noise/cap3.pdf

3. http://pcfarina.eng.unipr.it/Public/Acoustics-Course/Penn-State-Course/10_osp.pdf

Comment:

Title of the course: **Environmental hazards II. – Environmental radiation protection**	*NEPTUN-code:* RKXKA2ABNE	*Weekly teaching hours: l+cw+lb* 1+1+0	***Credit*:** 2 ***Exam type**:* tm
Course leader: Konrád Lájer, Dr.	*Position:* associate professor	*Required preliminary knowledge:* There is no requirement	

Curriculum:

History of atomic structure. Classification of radiations (ionizing and non-ionizing). Radiation from environmental. Detect of natural radioactivity. Law of natural activity. Particle radiations (α, γ, neutron). Penetrating power of radiations. Uses of nuclear energy and radiation (food preservation, nuclear power stations and weapons). Working method of a pressurized-water nuclear station. Relationship between mass defect and binding energy. Nuclear fission. Dose quantities in SI units. Radiation effects on human. Protection against radioactive radiation (time, distance, shielding). Nuclear disasters.

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection.

Able to solve tasks of water, soil, air, radiation, and noise protection, as well as of waste treatment and processing at proposal level; to participate in preparing decisions; to perform authority audits; and to take part in the operation of these technologies.

Able to communicate both verbally and in writing in their mother tongue and in at least one foreign language, in respect of professional issues, and to continuously develop their professional skills as required.

Open to professional cooperation with specialists related to their profession but involved in other areas.

Efforts to improve knowledge by on-going self-education and continuously update their knowledge of the world.

Constantly upgrading their knowledge of environment protection by attending organized professional development training courses.

Responsible proclamation and representation of the value system of the engineering profession; openness to professionally well-founded critical remarks.

Literature:

1. Serway Jewett: Physics for Scientist and Engineers

2. http://jrr.oxfordjournals.org/content/55/4/629.full

3. http://www.processindustryforum.com/hottopics/nucleardisasters

Comment:

Title of the course: **Environmental hazards III. - Waste Management**	***NEPTUN-code:*** RKXKA3ABNE	***Weekly classes:*** *lecture+practical work+lab work* 2+0+0	***Credit:*** 2 ***Exam type:*** e (written exam)
Course leader: Konrád Lájer, Dr.	***Position:*** associate professor	***Required preliminary knowledge (with Neptun code):***	

Curriculum:

The aim of the course is to introduce students to waste management technologies. The subject provides a comprehensive knowledge of theoretical concepts, types of waste quantity and composition of the waste. Furthermore, in the frame of the course, expectations and conceptions of the European Union's waste management and the Sustainable Waste Management in Hungary will be taught.

The subject deals primarily with sustainable management of waste materials and the available technologies that treat those materials successfully. Moreover, the course contains knowledge about technological solutions like emission streams. Part of the curriculum includes municipal solid waste, used (wreck) cars, electronic waste, batteries, rubber, plastic, glass, construction waste, packaging waste and other types of waste generated by industrial activity. Waste recovery, recycling as possible enemy solutions and the necessary preparation technologies will be presented as well. During the semester, we will examine how the composition of the various areas (residential, agricultural, industrial, etc.) influences waste and environmental impacts and sustainability principles in waste management. It shows the importance of the connection between waste management plan and the steps that are taken to deal with waste and its legal context as well. Waste collection, reloading and delivery of technological progress will be discussed in detail. The course describes the technological possibilities of disposing waste, such as orderly disposal, disposal of thermal and chemical processes or mechanical-physical processes. Main fields of the subject:

- environmental issues; waste as an environmental issue; applying environmental science to the management of waste;
- managing legal issues and activities in the cleaning and waste industries; managing human resources in the cleaning and wastes industries;
- mechanical, biological and thermal treatment of waste;
- environmental laws of waste management;
- contaminated land; landfill processes.

Professional competencies:

Comprehensive knowledge of the basic features and interrelations of environmental elements and systems, as well as of the environmentally harmful substances affecting them. Knowledge of major environmental technologies, equipment and structures associated with each technology, including the functioning and operation thereof.
Able to perform basic tests of the quantity and quality characteristics of environmental elements and systems by state-of-the-art measuring instruments; to draw up and implement measurement plans; and to evaluate data.

Able to solve tasks of water, soil, air, radiation, and noise protection, as well as of waste treatment and processing at proposal level; to participate in preparing decisions; to perform authority audits; and to take part in the operation of these technologies. Able to carry out assignments as environmental officer. Able to carry out management duties subject to sufficient professional experience. Able to reveal deficiencies in the technologies applied and process risks and to initiate mitigation measures after getting familiarized with the technology concerned. Constantly upgrading their knowledge of environment protection by attending organized professional development training courses.
Literature:
Márton Herczeg: Municipal waste management in Hungary EEA project manager Almut Reichel ETC/SCP February 2013 Eurostat, 2012: 'Waste database municipal waste' http://epp.eurostat.ec.europa.eu/portal/page/portal/waste/data/database Accessed May 2012
European Commission (2012). Support to Member States in improving waste management based on assessment of Member States' performance. Screening Report. Screening of all EU Member States' waste management performance. DRAFT Version 1. 12 April 2012
Nijkerk, A.A., Dalmijn, W.L. : Handbook of Recycling Techniques (ISBN 90-802909-3-9). Nijkerk Consultancy February 2001, 5th Revised edition (pp.1-254)
Ram Chandra: Environmental Waste Management, 2015 by Taylor and Francis Group, U.S.

Title of the course: **Environmental Technologies and Operations I.- Water and waste-water treatment technologies**	*NEPTUN-code:* RKXKM1ABNE	*Weekly teaching hours:* *lecture+practical work+lab work* 1+2+0	*Credit:* 3 *Exam type:* e (written exam)
Course leader: Rita Kendrovics-Boda, Dr.	*Position:* associate professor	*Required preliminary knowledge (with code too):* RKXKE1ABNE	

Curriculum:

The course objective is to show water (drinking) and wastewater treatment technologies and the requirements of drinking water, law and standard of drinking water and cleaned wastewater. The first aim of this course is to provide technological knowledge about advanced drinking water treatment. Focus is on both, conventional and new, emerging technologies. The course discusses relevant unit processes involved, and their role and location in a typical treatment chain. Physical, chemical and biological unit processes will be covered in the course. Further emphasis is on the effect of treatment on water quality and the transformations taking place in the water phase.

The second aim of this course is to describe wastewater definition, types of wastewater, and components of wastewater and sewer systems. Introduces wastewater treatment steps: Pre-treatment, Primary, Secondary and Tertiary treatment steps and available technologies within each step.

Highlights treatment technologies and reuse of sludge remaining in large volumes at the end of the treatment process.

Professional competencies:

Comprehensive knowledge of the basic features and interrelations of environmental elements and systems, as well as of the environmentally harmful substances affecting them.

Knowledge of major environmental technologies, equipment and structures associated with each technology, including the functioning and operation thereof.

Able to perform basic tests of the quantity and quality characteristics of environmental elements and systems by state-of-the-art measuring instruments; to draw up and implement measurement plans; and to evaluate data.

Able to solve tasks of water, soil, air, radiation, and noise protection, as well as of waste treatment and processing at proposal level; to participate in preparing decisions; to perform authority audits; and to take part in the operation of these technologies.

Able to carry out management duties subject to sufficient professional experience.

Able to reveal deficiencies in the technologies applied and process risks and to initiate mitigation measures after getting familiarized with the technology concerned.

Constantly upgrading their knowledge of environment protection by attending organized professional development training courses.

Literature:

Nicholas P. Cheremisinoff, Ph.D.: Handbook of water and wastewater treatment technologies, ISBN: 0-7506-7498-9, in e-learning system

Dr. Michael R. Templeton, Prof. David Butler:Introduction to wastewater treatment in e-learning system

Nicholas P. Cheremisinoff: Handbook of water and wastewater treatment technologies in e-learning system

Title of the course: **Environmental Technologies and Operations II.- Renewable energy**	*NEPTUN-code:* RKXKM2ABNE	*Weekly teaching hours:* *lecture+practical work+lab work* 2+0+0	*Credit:* 2 *Exam type:* tm
Course leader: Rita Kendrovics-Boda, Dr.	*Position:* associate professor	*Required preliminary knowledge (with code too):* -	

Curriculum:

Students will acquire knowledge and skills about the utilization of energy gained from renewable energy sources: The basics of energy supply. Energy consumption in Hungary. Wind energy. Hydro power. Biomass as an energy source. Liquid bio fuels. Geothermal energy. Utilization of terrestrial heat source. Utilization of solar energy. Photovoltaic conversion. Hybrid systems.

Professional competencies:

Able to perform basic tests of the quantity and quality characteristics of environmental elements and systems by state-of-the-art measuring instruments; to draw up and implement measurement plans; and to evaluate data.
Able to carry out management duties subject to sufficient professional experience.
Able to reveal deficiencies in the technologies applied and process risks and to initiate mitigation measures after getting familiarized with the technology concerned.
Collaboration with civil organizations engaged in environment protection, but willing to argue in order to develop optimal solutions.
Taking responsibility towards society for their decisions made in the scope of environment protection.

Literature:

1. Bent Sørensen: Renewable Energy, 4th Edition, Physics, Engineering, Environmental Impacts, Economics and Planning, Academic Press, 2010, eBook ISBN: 9780080890661 Hardcover ISBN: 9780123750259

2. B Viswanathan: An Introduction to Energy Sources, Indian Institute of Technology 2006, 289 pages, https://nccr.iitm.ac.in/ebook%20final.pdf

3. Robert Ferry, Elizabeth Monoian: A Field Guide to Renewable Energy Technologies, Society for Cultural Exchange 2012, ISBN/ASIN: 061561597X, ISBN-13: 9780615615974; Number of pages: 71

Title of the course: **Public Health**	*NEPTUN-code:* RKXKU1ABNE	*Weekly teaching hours:* 2+0+0	*Credit*: 2 *Exam type:* e
Course leader: Hosam Bayoumi, Dr.	*Position:* university private professor, associate professor	*Required preliminary knowledge:* RKXBI1EBNE	

Curriculum:

The science of public health and environmental hygiene tasks and methods. The concept of health and disease. History and outstanding personalities of Public Health. Organizational structure and system of national and international public health. Demographic Fundamentals, demographic characteristics of Hungarian and international situation. Demography and epidemiology basics, risk assessment and testing methods. Domestic and international epidemiological situation report. The main tasks of our education and health sectors. The structure of public health, including health care. The levels of prevention and levels. The health care and public health systems in Hungary. Non-communicable disease epidemiology, prevention. The impact of globalization on health. Health care and health promotion. Mental Health. City health study. Air, soil and water hygiene. Infection Control. Ionizing and non-ionizing radiation. Structure of immune system functioning. Antibodies. Immunity and vaccines. Transplantation, transfusion. Antibiotics. Allergy, AIDS, autoimmune disease. The skin organ system, the respiratory system and the movement of the body and the metabolic processes of environmental health problems. Diet and Health Study. The Hungarian diet features. Nutrition environmental health aspects. Alternative forms of the nutrition. Environmental health: consequences of globalization. Epigenetics. Climate change. Occupational hygiene and health care. Non-infectious diseases: Heart vascular- and cancer epidemiology. Mental health promotion. Old- and new addictive diseases. Protection current tasks for mother, child and youth. The aging societies and public health challenges of old age. Wastes caused health problems. Pollution effects. The basic terms of toxicology. The presence of environmental toxicants in food. The metals and their compounds and toxicology of pesticides. Toxicological tests and their characteristics, measurement options. Genotoxicity and the expected effects. Epidemiology and epidemiological tasks of infectious disease and the environment. Hospital hygiene, prevention of nosocomial infections. Acquisition of Health and public health knowledge. Environmental and health-conscious lifestyle education. The weather and the human's body adaptation. The recognition of the relationship between environment and health. The expected health effects due to climate change

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection.
Knowledge of the learning, knowledge acquisition, and data collection methods of the special fields of environment protection, their ethical limitations and problem solving techniques.
Comprehensive knowledge of the basic features and interrelations of environmental elements and systems, as well as of the environmentally harmful substances affecting them.
Able to cooperate with engineers involved in the development and application of production and other technologies to develop the given technology in terms of environment protection.
Able to participate creatively in engineering work based on their multidisciplinary skills, as well as to adapt to continuously changing circumstances.
Collaboration with civil organizations engaged in environment protection, but willing to argue in order to develop optimal solutions.

Constantly upgrading their knowledge of environment protection by attending organized professional development training courses. Sharing experiences with colleagues, thus promoting their development. Taking responsibility towards society for their decisions made in the scope of environment protection.
Literature:
Lecture's notice and PPT
V. Rozanov (2016): Stress and Epigenetics in Suicide, 1st Edition, Academic Press, Print Book ISBN: 9780128051993
Emerging Infectious Diseases www.cdc.gov/eid Vol. 22, No.10, October 2016
International travel and health (2013): Information on health risks for travellers. IBSN: 9789240686434
Merck and the Merck Manuals (2011): Infectious Diseases, in: Merck Manual Merck Sharp & Dohme Corp.
Michael Stuart Bronze, Burke A Cunha, Ronald A Greenfield, et al. (2011): Infectious Diseases Medscape Reference WebMD
• Victorian State Government, Australia (2009): Blue Book. Guidelines for the control of infectious diseases Victorian State Government
Paget Stanfield et al. (2008): Diseases of Children in the Subtropics and Tropics. 4th edition ISBN: 9780340506332
David Coggon, David Barker, Geoffrey Rose (2008): Epidemiology for the Uninitiated. BMJ Publishing Group
• Comment: Attendance of lectures is compulsory! Examination requirements: It is not allowed to be absence more than 4 lectures. 2 midterms with at least a pass grade (50-64 = 2%). Requirements to pass the course: Two written exams. Solve the Homework and write an assay and to pass the oral examination.

Title of the course: **Nature and landscape protection**	*NEPTUN-code:* RKXTT1ABNE	*Weekly teaching hours: l+cw+lb* 1+2+0	***Credit*:** 3 ***Exam type**:* e
Course leader : Krisztina Demény Dr.	***Position:*** senior lecturer	***Required preliminary knowledge:*** -	

Curriculum:

Definition of landscape, natural and cultural landscape. Hierarchical system of landscape. Landscape-forming factors (biotic and abiotic factors). Types of landscape, landscape potential and protection. History of nature protection/conservation in Hungary and in the world. Major types of protected areas. Subjects of nature protection/conservation: geological, hydrological, zoological, botanical, cultural values. Main protected areas in Hungary and in the world.

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection.
Comprehensive knowledge of the basic features and interrelations of environmental elements and systems, as well as of the environmentally harmful substances affecting them.
Undertaking and authentically representing the social role of environment protection, its basic relationship with the world.
Open to professional cooperation with specialists related to their profession but involved in other areas.

Literature:

1. Kertész, A. (2013): Landscape and environmental assessment (http://p2014-1.palyazat.ektf.hu/public/uploads/kertesz-landscape-and-environmental-assessment_532c37799f86c.pdf)

2. Stuart Chape et al.(edit) 2008: The world protected areas (statues, values and prospects in the 21th century), University of California Press (http://www.the-eis.com/data/literature/The%20worlds%20protected%20areas.pdf

3. PPT files on the homepage of Moodle learning system

Comment:

Title of the course: **Project Work**	***NEPTUN-code:*** RKPPR1ABNE	***Weekly classes:*** *lecture+practical work+lab work* 0+0+2	***Credit:*** 4 ***Exam type****:* tm
Course leader: Rita Kendrovics-Boda, Dr.	***Position:*** associate professor	***Required preliminary knowledge (with Neptun code):*** RKXKE1ABNE, RKXKE2ABNE, RKXKA1ABNE	

Curriculum:

The course aims to provide students expertise and experience in integrating and applying knowledge from previous courses, as well as to extend students' skills in a certain field of environmental science. It is important to work on field, measure in genuine environment and lab and get experience in that in order to be able to solve complex problems in the future. Based on these experiences on field, the problem-solving skills of the students will improve. Moreover, due to field work, students' environmental awareness will be increased.

During the semester, students are working in small groups (4 person max.). Each group gets a different certain environmental problem to solve, from localizing the problem to finding the most appropriate solution for that. At the end of the semester, students have to present their project work and solutions in detail, and hand in a written report as well.

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection.
Knowledge of the learning, knowledge acquisition, and data collection methods of the special fields of environment protection, their ethical limitations and problem solving techniques.
Comprehensive knowledge of the basic features and interrelations of environmental elements and systems, as well as of the environmentally harmful substances affecting them.
Knowledge of the main methods to examine the quantity and quality features of environmental elements and systems, their typical measuring instruments and limitations thereof, as well as methods for the evaluation of data measured.
Able to participate creatively in engineering work based on their multidisciplinary skills, as well as to adapt to continuously changing circumstances.
Open to professional cooperation with specialists related to their profession but involved in other areas.
Taking responsibility towards society for their decisions made in the scope of environment protection.
Cooperation with qualified experts from other special areas (primarily economic and legal) in the course of completing professional tasks.

Literature:

Curriculum in the e-learning system

ppt of the lesson

Name of lecture: **Environmental and nature field exercises**	***NEPTUN-cod:*** RKXGY1EBNE	***Numbers of hours:*** *l+cw+lb* 0+0+3	***Credit*** 4 ***Exam:*** tm
Course leader: Krisztina Demény Dr.	***Position:*** senior lecturer	***Preliminary credits:***	

Curriculum:

The aim of the course is to apply the theoretical knowledge acquired in professional subjects to practical work, field work and field visits. Sampling and measurements on the field and in the lab provide students with experience that they can build upon to solve a problem later on. The main objective of the course is to create a competence-based environmental engineer training in addition to advanced theoretical science training. During the semester the students will participate in field visits and field work to identify environmental and nature conservation issues. Direct contact with the environment helps to develop an environmentally conscious approach, to recognize the causal relationships and relationships between the state of the natural environment and human activity. It is possible to observe anthropogenic impacts in the environment - waste incineration plant, sewage treatment plant, landfill, small water streams, municipal infrastructure, etc., and to carry out impact studies. During the course students will have the opportunity to interpret and analyze complex environmental and nature conservation problems.

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection.
Knowledge of the learning, knowledge acquisition, and data collection methods of the special fields of environment protection, their ethical limitations and problem solving techniques.
Knowledge of the main methods to examine the quantity and quality features of environmental elements and systems, their typical measuring instruments and limitations thereof, as well as methods for the evaluation of data measured.
Able to perform environmental impact assessments and to participate in compiling impact studies.
Able to apply in practice as well the regulations and requirements of health and safety, fire protection, and safety engineering as related to their special field.
Able to participate in project and proposal implementation and audit tasks based on their knowledge.
Able to participate creatively in engineering work based on their multidisciplinary skills, as well as to adapt to continuously changing circumstances.
Undertaking and authentically representing the social role of environment protection, its basic relationship with the world.

Literature:

moodle -e-learning

ppt of the lecture

Technical engineering skills (20-50cr.):

Title of the course: **Technical mechanics**	***NEPTUN-code:*** RKXME1EBNE	***Weekly teaching hours:*** *l+cw+lb* 2+2+0	***Credit*****:** 5 ***Exam type****:* tm
Course leader: Lóránt Szabó, Dr.	***Position:*** senior lecturer	***Required preliminary knowledge:*** There is no requirement	
Curriculum:			
Engineering mechanics is the application of mechanics to solve problems involving common engineering elements. The goal of this Engineering Mechanics course is to expose students to problems in mechanics as applied to plausibly real-world scenarios. Dividing of Engineering mechanics. Physical quantities. **Statics** (part of dynamics). Basic concepts, fundamentals. Planar forces, force systems. Power system bound to tractrix action on the rigid body. Planar forces, force systems. Centre of gravity, bearing force. Holders and articulated mechanisms. Friction. Strength of Materials. Basic concepts, stress and stress states. Material Laws. Simple strain of prismatic bars. Stress theories. **Kinematics.** The kinematics of a point. Basic concepts, uniform and uniformly changing motion. Projectile motions, circular motion, harmonic motion, swinging motion. Kinematics of the rigid body. Basic concepts, velocity and acceleration states, elemental and finite motions. The kinematics of relative motions. **Kinetics** (part of dynamics). Kinetics of the material point, axioms, general theorems. The free, forced and relative motion of the material-point. The kinetics of a rigid body. The moment of inertia, and general theorems and principles. The rotation of a rigid body around an axis, translational and plane motion of a rigid body.			
Professional competencies:			
Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection. Adequate perseverance and endurance of monotony to perform practical operations. Open to professional cooperation with specialists related to their profession but involved in other areas. Efforts to improve knowledge by on-going self-education and continuously update their knowledge of the world. Responsible proclamation and representation of the value system of the engineering profession; openness to professionally well-founded critical remarks.			
Literature:			
1. Serway Jewett: Physics for Scientist and Engineers			
2. (**Statics**) http://www.icivil-hu.com/Civil team/2nd/Statics/Statics,%20R.C.%20Hibbeler,%2012th%20book.pdf			
3. (**Dynamics**) https://docs.google.com/file/d/0Bw8MfqmgWLS4V0NFR2dVUWpuYzg/edit			
Comment:			

Title of the course: **Technical drawing and documentation**	***NEPTUN-code:*** RKXMR1EBNE	***Weekly teaching hours:*** *lecture+practical work+lab work* 1+0+2	***Credit:*** 4 ***Exam type****:* tm
Course leader: Rita Kendrovics-Boda, Dr.	***Position:*** associate professor	***Required preliminary knowledge (with code too):*** -	

Curriculum:

The aim of this course is to provide an introduction to drawing fundamentals and to develop drawing skills of students. The first part of the course covers such topics as layout of Technical Drawings, line styles, lettering, scale, geometric construction, transformation, projection (orthographic projection, central or perspective projection, oblique projection), axonometric view (isometric, diametric, Cavalier etc.). The second part of the course focuses on topics as follows: sketching, dimensioning, sectioning, fits and tolerances, surfaces roughness, symbolical representation, detail and assembly drawing.

Professional competencies:

In possession of state-of-the-art IT skills, being able to use professional databases and certain design, modelling, and simulation software depending on their specialty.
Adequate perseverance and endurance of monotony to perform practical operations.
Able to cooperate with engineers involved in the development and application of production and other technologies to develop the given technology in terms of environment protection.
Able to participate creatively in engineering work based on their multidisciplinary skills, as well as to adapt to continuously changing circumstances.

Literature

Coli H.Simmons, Dennis E. Maguire: Manual of Engineering drawing in e-learning system

David Anderson: Technical drawing, Spring, 2006

Title of the course: **Machine elements**	***NEPTUN-code:*** RKEGZ1ABNE	***Weekly teaching hours:*** *lecture+practical work+lab work* 1+2+0	***Credit:*** 3 ***Exam type****:* e
Course leader: Andrea Paukó, Dr.	***Position:*** associate professor	***Required preliminary knowledge (with code too):*** RKXMR1EBNE	

Curriculum:

The course aims to introduce the most basic machine parts, giving insight to the engineering speciality. The subject deals with machine parts and machine structures used in up-to-date machines, their types, properties and design principles. Main topics:
The concept of machine elements, groups and design principles

- rotating machine parts, shaft joints,
- mechanical drives: gear drives, worm gearing, chain drive, belt drive. Principle of friction transmission,
- brakes: structure, function and design basics,
- supporting shafts, bearings, basic concepts of tribology
- storage elements: pipe lines and fittings, pipe joints, valve, gate valve, check valve. Flow losses of pipe networks, characteristic curves, reservoirs and seals,
- grouping of fluid machinery, characteristic parameters. Essential features of pumps, pump head, efficiency, and useful power.
- structure of ventilation equipment and operation (fans, blowers, compressors, vacuum pumps).

Professional competencies:

Knowledge of major environmental technologies, equipment and structures associated with each technology, including the functioning and operation thereof.
Adequate perseverance and endurance of monotony to perform practical operations.
Able to cooperate with engineers involved in the development and application of production and other technologies to develop the given technology in terms of environment protection.
Able to reveal deficiencies in the technologies applied and process risks and to initiate mitigation measures after getting familiarized with the technology concerned.

Literature:

Steven R. Schmid, Bernard J. Hamrock, Bo. O. Jacobson: Fundamentals of Machine Elements, ISBN 9781439891322

Machine elements, handbook, http://www.gbi.bgk.uni-obuda.hu/oktatas/segedanyagok/gepelemek/Machine_Design_2/Machine%20Element.pdf

Title of course: **Environmental analytics**	***NEPTUN-code:*** RKXKA1EBNE	***Weekly classes:*** *lecture+workshop+lab work* 1+0+2	***Credit*****:** 3 ***Exam type.:*** e
Course leader: Ágnes Bálint-Mészáros, Dr.	***Position:*** associate professor	***Required preliminary knowledge (with Neptun code):*** RKXAK1ABNE	

Curriculum:

Due to the human activity a large number of pollutant got into the environment. Therefore became important the detection of toxic substances in our environment. This is a possible tool the environmental analysis.
The environmental analytical chemistry uses the methods of analytical chemistry and other technics to study the environment. The primary goal is to introduce sampling of different environmental components (the atmosphere, above-ground water and groundwater and soil) to study, that these samples are polluted or not by organic and inorganic toxic substances.
We present the physical and chemistry bases of the environment protection analytics.
We present the different validation methods and we talk about the importance of the standardisation.
The students recognise the different sampling methods and sample preparation procedures.
We review the atom and molecule spectroscopy procedures.
The most important separation technical methods will be presented.

During the laboratory practices will be applied the methods for environmental samples, which were studied during the lectures. The students prepare the environmental samples for measurement and measure the concentration of different pollutants (organic and inorganic) by analytical devices.

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection.
Knowledge of the learning, knowledge acquisition, and data collection methods of the special fields of environment protection, their ethical limitations and problem solving techniques.
Knowledge of major environmental technologies, equipment and structures associated with each technology, including the functioning and operation thereof.
Able to perform basic tests of the quantity and quality characteristics of environmental elements and systems by state-of-the-art measuring instruments; to draw up and implement measurement plans; and to evaluate data.
Able to participate creatively in engineering work based on their multidisciplinary skills, as well as to adapt to continuously changing circumstances.
Undertaking and authentically representing the social role of environment protection, its basic relationship with the world.
Constantly upgrading their knowledge of environment protection by attending organized professional development training courses.
Taking responsibility towards society for their decisions made in the scope of environment protection.

Literature

1. Roger N. Reeve: Introduction to Environmental Analysis, Wiley, 2002, ISBN 0-471-49295-7
2. Chunlong Zhang: Fundamentals of Environmental Sampling and Analysis, Wiley, ISBN: 978-0-471-71097-4, 456 pages April 2007
3. Editors: Baranowska, Irena (Ed.): Handbook of Trace Analysis, Fundamentals and Applications, Springer International Publishing Schwitzerland, 2016, ISBN 978-3-319-19614-5
Comment:

Title of course: **Data processing of measurements**	***NEPTUN-code:*** RKXMF1ABNE	***Weekly classes:*** *lecture+workshop+lab work* 1+0+2	***Credit*****:** 3 ***Exam type.*** *:*tm
Course leader: González Mastrapa Henry, Dr.	***Position:*** college associate professor	***Required preliminary knowledge (with Neptun code):*** RKXMA2EBNE	

Curriculum:

If the environmental components (air, water, soil) are examined, than a big amount of measurement data will be collected. The data with a big quantity cannot be interpreted. It is necessary to evaluate our data. Our data should be processed to interpret them.
In simpler cases data processor programs are used, than e.g. Microsoft Excel.
The principle of data sorting will be presented.
We may need special statistical software packages, that we may establish contexts between our measured data with their help. We present the statistical basic principles (descriptor statistics, ANOVA etc.).
Several statistical software packages exist: eg. SPSS, SAS etc..
Origin software package will be presented which is one of the most important program of scientific data processing.
The freeware software R can be written our necessary procedures for analysis of our data statistically. We can compare our algorithms which can be manufactured by Matlab help with the programs written with statistical software packages.

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection.
In possession of state-of-the-art IT skills, being able to use professional databases and certain design, modelling, and simulation software depending on their specialty.
Knowledge of the learning, knowledge acquisition, and data collection methods of the special fields of environment protection, their ethical limitations and problem solving techniques.
Knowledge of the main methods to examine the quantity and quality features of environmental elements and systems, their typical measuring instruments and limitations thereof, as well as methods for the evaluation of data measured.
Able to reveal deficiencies in the technologies applied and process risks and to initiate mitigation measures after getting familiarized with the technology concerned.
Efforts to improve knowledge by on-going self-education and continuously update their knowledge of the world.
Constantly upgrading their knowledge of environment protection by attending organized professional development training courses.

Literature:

1. Matthias Kohl: Introduction to statistical data analysis with R, bookboon.com, 2015, ISBN: 978-87-403-1123-5, 1 edition. Pages : 228
2. Felix C. Veroya: Introduction to Statistical Process Control, A Problem Solving Process Approach, bookboon.com, 2014, ISBN: 978-87-403-0789-4, 1 edition, Pages: 72

Comment:

Title of the course: **Open and Closed loop Control**	*NEPTUN-code:* RKXSV1EBNE	*Weekly teaching hours:* *l+cw+lb* 1+0+2	***Credit*:** 3 ***Exam type:*** tm
Course leader: Lóránt Szabó, Dr.	***Position:*** senior lecturer	***Required preliminary knowledge :*** NMXAN1EBNE	

Curriculum:

Learning the basic concept of the open and closed loop control. The open loop control using only On/Off signals. Overview PLC systems. Open loop control with pneumatic final elements.

Review the theoretical background of closed loop control, structure of a control system, signals and basic control blocs. Time response, frequency response, steady state characteristics.

Professional competencies:

In possession of state-of-the-art IT skills, being able to use professional databases and certain design, modelling, and simulation software depending on their specialty.
Efforts to improve knowledge by on-going self-education and continuously update their knowledge of the world.
Responsible proclamation and representation of the value system of the engineering profession; openness to professionally well-founded critical remarks.
Sharing experiences with colleagues, thus promoting their development.

Literature:

1. Javad, Mohammadpour: Control of Linear Parameter Varying systems. Chapter: 1, 2, 3; ISBN: 978-1-4674-1832
2. Keviczky, László: Control Engineering, Chapter: 1, 2, 4, 6, 8; ISBN: 978-963-9819-74-0
3. E-learning materials in Moodle (lectures)

Comment:

Environmental analysis and environmental informatics (10-30cr.):

Title of the course: **Informatics I.**	***NEPTUN-code:*** RMEIN1ABNE	***Weekly teaching hours:*** *l+cw+lb* 1+0+3	***Credit*****:** 4 ***Exam type****: tm*
Course leader: Eszter Kormány, Dr.	***Position:*** senior lecturer	***Required preliminary knowledge:*** -	
Curriculum:			
The aim of the course is to form a basis of informatics for the respective university studies and for the subsequent engineering career as well. Throughout the lectures one will receive insight of the formation, development, current state and areas of development related to the science of informatics. The course covers computer architectures and the necessary hardware and software components as well as the application of the ethical and safe use. The seminars are focusing on data analysis, problem solving and building algorithms. The skills acquired thereof could be applied to solve tasks of the corresponding subjects and to professional work later on.			
Professional competencies:			
In possession of state-of-the-art IT skills, being able to use professional databases and certain design, modelling, and simulation softwares depending on their specialty. Adequate perseverance and endurance of monotony to perform practical operations.			
Literature:			
1. PPT files on the homepage of Moodle learning system			
Comment: The ppt files are continuously renewed according to the new literature data.			

Title of the course: **Informatics II.**	***NEPTUN-code:*** RMXIN2EBNE	***Weekly teaching hours:*** *l+cw+lb* 0+0+3	***Credit*****:** 4 ***Exam type****: tm*
Course leader: Eszter Kormány, Dr.	***Position:*** senior lecturer	***Required preliminary knowledge:*** RMEIN1ABNE	

Curriculum:

In the framework of the course the basics of database manipulation and programming are covered. With the aid and application of MS Access one will be able to construct and manipulate databases. The course introduces database design, normalization steps, creation of tables, setting of keys and relations. Queries and reports are also included. The use of the SQL is part of the course as well.

The course covers the basis of programming and means of algorithm description as well as their usage. One will have the opportunity to create simple algorithms and functions for MS Office applications.

Professional competencies:

In possession of state-of-the-art IT skills, being able to use professional databases and certain design, modelling, and simulation software depending on their specialty.
Adequate perseverance and endurance of monotony to perform practical operations.

Literature:

1. PPT files on the homepage of Moodle learning system

Comment: The ppt files are continuously renewed according to the new literature data.

Title of the course: **Geoinformatics (GIS)**	***NEPTUN-code:*** RKXTI1ABNE	***Weekly teaching hours:*** *l+cw+lb* 1+0+2	***Credit*****:** 3 ***Exam type****: tm*
Course leader: Krisztina Demény Dr.	***Position:*** senior lecturer	***Required preliminary knowledge:***	
Curriculum:			
The teaching aim of the course is to introduce the basic theory and practice of GIS. The course will highlight the development of GIS, it will present the database model of GIS, the basic data management techniqs and the data analyses method. The course will also demonstrates the data visualisation methods and possibilities of GIS.			
Professional competencies:			
In possession of state-of-the-art IT skills, being able to use professional databases and certain design, modelling, and simulation software depending on their specialty. Knowledge of the learning, knowledge acquisition, and data collection methods of the special fields of environment protection, their ethical limitations and problem solving techniques. Adequate perseverance and endurance of monotony to perform practical operations.			
Literature:			
1. Tomislav Hengl: Geostatisitcal mapping http://spatial-analyst.net/book/ Michael de Smith, Paul Longley, Mike Goodchild: Geospatial Analysis - A comprehensive guide (http://www.spatialanalysisonline.com/)			
2. John P. Snyder : Map Projections: A Working Manual http://pubs.er.usgs.gov/publication/pp1395			
Comment:			

Environmental management (10-30cr.):

Title of the course: **Environmental Management**	***NEPTUN-code:*** RKXKZ1EBNE	***Weekly teaching hours:*** *l+cw+lb* 1+2+0	***Credit*****:** 3 ***Exam type*** *: tm*
Course leader: Imre Biczó, Dr.	***Position:*** master teacher	***Required preliminary knowledge :***	

Curriculum:

Environmental management is a rapidly evolving area of science; it is important for more and more sectors of human activity and plays a crucial role in establishing sustainable development.
The Environmental Management focuses on environment, society and public policy, including resource management, environmental assessment and the social, economic and policy aspects of environmental change.
The course deal with different aspects of environmental management to give some insights to evaluate environmental issues and contribute to the economic and policy decision making process in different organizations.

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection.
In possession of state-of-the-art IT skills, being able to use professional databases and certain design, modelling, and simulation software depending on their specialty.
Able to communicate both verbally and in writing in their mother tongue and in at least one foreign language, in respect of professional issues, and to continuously develop their professional skills as required.
Able to participate in project and proposal implementation and audit tasks based on their knowledge.
Able to participate creatively in engineering work based on their multidisciplinary skills, as well as to adapt to continuously changing circumstances.
Efforts to improve knowledge by on-going self-education and continuously update their knowledge of the world.

Literature:

C.J. Barrow; Environmental Management for Sustainable Development, 2nd edition, Routledge

S. Schaltegger, R Burritt, H. Petersen; An Introduction to Corporate Environmental Management, Greenleaf Publishing

Comment:

Title of the course: **Environmental law**	***NEPTUN-code:*** RKEKJ1ABNE	***Weekly teaching hours:*** *l+cw+lb* 2+0+0	***Credit*****:** 3 ***Exam type****: tm*
Course leader: Imre Biczó Dr.	***Position:*** senior lecturer	***Required preliminary knowledge: -***	

Curriculum:

- Introduction to Law: Overview of the main legal traditions of the World. Introduction to the Common law tradition (Introduction to the English Law. Sources of law. English court system, Contracts in English law, the law of torts, Corporate Law)
- Introduction to the Civil law tradition (German, French law).
- EC law
- Introduction to Hungarian law:
- Structure, Hungarian law of contracts, corporations, environmental law
- Introduction to Environmental protection, history
- EC/EU Environmental law: EU Primary legislation, right to environment
- Principles, Programmes and Strategies
- Legal Instruments I.: Substantive environmental law
- Legal instruments II: Procedural rules
- Liability measures
- Organs, Authority
- Environment and development: sustainable development, Environmental protection in EU Funds

Professional competencies:

Knowledge of the methodology and legal regulations for performing environmental impact assessments and for compiling impact studies.
Knowledge of requirements and methods for health and safety, fire protection, safety engineering and remediation as related to the field of environment protection.
Able to perform public administrative and authority tasks related to environment protection after getting acquainted with the duty assigned to them.
Able to carry out assignments as environmental officer.
Able to take part in environment expertise, advisory, and decision preparation work.
Efforts to solve tasks and make management decisions by being aware of the opinions of the colleagues supervised, possibly in cooperation therewith.
Taking responsibility towards society for their decisions made in the scope of environment protection.
Performing environmental tasks individually and managing special environment protection work independently even in unexpected decision making situations.
Monitoring regulatory, technical, technological, and administrative changes related to the special field and enforcing them in their professional work.

Literature:

1. Nancy E. Marion: Making Environmental Law: The Politics of Protecting the Earth, Praeger Publisher, Santa Barbara, CA, 2011, 376 pages

2. Angelo, Mary Jane: Harnessing the Power of Science in Environmental Law: Why We Should, Why We Don't, and How We Can, Texas Law Review Publisher, 2008

Comment:

Title of the course: **Risk analysis**	***NEPTUN-code:*** RKXKO1ABNE	***Weekly teaching hours:*** *l+cw+lb* 2+1+0	***Credit*****:** 3 ***Exam type****: e*
Course leader: Sándor Pekker, Dr.	***Position:*** research professor	***Required preliminary knowledge:***	

Curriculum:

Definition and types of risk
The risk-taking
Risk measures
The controllability of risk
Environmental risks and environmental functions of companies
Health Risk Assessment (HRA)
Ecological Risk Assessment (ERA)
The risk of natural hazards, disasters
The environmental risk of toxic elements
Environmental risks in the information society
Special and border areas.

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection.
In possession of state-of-the-art IT skills, being able to use professional databases and certain design, modelling, and simulation software depending on their specialty.
Knowledge of the learning, knowledge acquisition, and data collection methods of the special fields of environment protection, their ethical limitations and problem solving techniques.
Knowledge of the methodology and legal regulations for performing environmental impact assessments and for compiling impact studies.
Able to perform environmental impact assessments and to participate in compiling impact studies.
Able to perform public administrative and authority tasks related to environment protection after getting acquainted with the duty assigned to them.

Literature:

1. Marvin Rausand: Risk Assessment: Theory, Methods, and Applications (Statistics in Practice), 1st Edition, Wiley, 2011, ISBN-13: 978-0470637647; ISBN-10: 0470637641

2. Thomas Simon: Edition: Fundamentals of Applied Risk Assessment – eBook, Edition: 2; Copyright: 2013 , Kendall Hunt, Pages: 532; ISBN 9781465229373

3. Ian Lerche,Walter Glaesser: Environmental Risk Assessment: Quantitative Measures, Anthropogenic Influences, Human Impact, Springer Science & Business Media, 2007, 343 pages; ISBN: 9783540297093

Title of the course: **Environmental impact assessment**	***NEPTUN-code:*** RKXHV1ABNE	***Weekly classes:*** *lecture+practical work+lab work* 1+1+0	***Credit:*** 2 ***Exam type****:* tm
Course leader: Imre Biczó, Dr.	***Position:*** master teacher	***Required preliminary knowledge (with Neptun code):***	

Curriculum:

Students get the concept of impact assessment and to study the methodology of impact assessments. Learn the main steps of creating the environmental impact assessment and it's purpose, as well as the structure of the environmental management system and the methodology of environmental auditing. To get know with the procedures that occur during the environmental engineering practices within the impact assessment methodology. The objective of this course is attitude shaping and transferring knowledge which can be used in practice.

Professional competencies:

Able to perform basic tests of the quantity and quality characteristics of environmental elements and systems by state-of-the-art measuring instruments; to draw up and implement measurement plans; and to evaluate data.
Able to solve tasks of water, soil, air, radiation, and noise protection, as well as of waste treatment and processing at proposal level; to participate in preparing decisions; to perform authority audits; and to take part in the operation of these technologies.
Performing environmental tasks individually and managing special environment protection work independently even in unexpected decision making situations.
Cooperation with qualified experts from other special areas (primarily economic and legal) in the course of completing professional tasks.

Literature:

1. Alan Gilpin: Environmental Impact Assessment Cutting Edge for the 21st CenturyCambridge University Press, Online publication date: June 2012, Print publication year: 1994, Online ISBN: 9781139166539, https://doi.org/10.1017/CBO9781139166539
2. Edited by Peter Wathern: Environmental Impact Assessment, Theory and Practice, Print publication date: December 2015, Online publication date: February 2013, Print ISBN: 9781138137448, eBook ISBN: 9780203409978, Adobe ISBN: 9781134897728, 10.4324/9780203409978
3. Charles H., Eccleston: Environmental Impact Assessment: A Guide to Best Professional Practices 1st , Kindle Edition,

Environmental management systems specialization:

Name of subject: **Industrial raw material and waste**	***NEPTUN-code:*** RMWIH1EBNE	***Number of hours:*** *lectures*+ classroom practice+lab practice 2+1+0	***Credit:*** 5 ***Requirement:*** tm
Course leader: ***Cecília Tamásné-Nyitrai Dr.***	**Position:** college professor	***Pre-requisite:*** none	
Curriculum:			
Manufacture of semi - finished paper products. Paper raw materials, mechanical, thermomechanical semi-finished products, pulp bleaching. Preparation of paper pulp. Dissolving fiber, grinding, gluing, filling, dyeing. Paper machines. Types of paper machines, main parts. Knowledge of packaging material. Packaging materials containing metal. Packaging based on glass, wood and textiles. Plastic materials for packaging. Natural based plastics in packaging. Synthetic plastics: polyolefins, chlorine-containing, PU, PA, PS, PET, EVA, PVOH, EVOH, etc. characteristics, its use in packaging. Flexible, semi-rigid and rigid plastic packaging. Grouping of printing processes, features, product types, sheet sizes, special processing needs. Text and image processing operations, color decomposition, film processing, montage, printing. Printing machine alignment, number of copies, operations on binding technology, folding systems. The structure of the book, the types of knitting, the journal, the daily newspaper, and other printing products. Environmental issues and solutions for the paper, printing and packaging industry. Cardboard and board manufacturing. Paper Removal. Unpacking operations, calendars, arc cutting. Paper processing. Areas of paper processing. Types of wave products and their manufacture. Typical structural units of printing presses, principles of operation of dyeing, wetting, printing machines, sheet and roll printing machines. Dryers, solvent recovery, extraction equipment. Technologies, characteristics, applications of composite packaging products. Laboratory exercises include: - identification of plastics, - general properties of packaging plastics: physico-chemical and mechanical properties, - barrier properties, temperature tolerance, processability. Environmental issues and solutions for the paper, printing and packaging industry.			
Professional competencies:			
Comprehensive knowledge of the basic features and interrelations of environmental elements and systems, as well as of the environmentally harmful substances affecting them. Knowledge of the concepts and tools of economics and environmental economics, project and environment management in environment protection. Knowledge of major environmental technologies, equipment and structures associated with each technology, including the functioning and operation thereof. Knowledge of the basics of energy management, options for energy production, their advantages and disadvantages, as well as the concept and feasibility options of sustainable development. Able to cooperate with engineers involved in the development and application of production and other technologies to develop the given technology in terms of environment protection.			

Able to participate creatively in engineering work based on their multidisciplinary skills, as well as to adapt to continuously changing circumstances. Able to reveal deficiencies in the technologies applied and process risks and to initiate mitigation measures after getting familiarized with the technology concerned. Open to professional cooperation with specialists related to their profession but involved in other areas. Responsible proclamation and representation of the value system of the engineering profession; openness to professionally well-founded critical remarks. Cooperation with qualified experts from other special areas (primarily economic and legal) in the course of completing professional tasks.
Literature:
1. Wulfhorst, B., Gries, T., Veit, D.: Textile Technology, ISBN 9781569903711
2. X. Tao: Smart Fibres, Fabrics and Clothing, 1st Edition, ISBN: 9781855735460
4. https://elearning.uni-obuda.hu/
Remark:

Name of subject: **Technologies of manufacturing technologies and environmental protection**	***NEPTUN-code:*** RTEFT1EBNE	***Number of hours:*** *lectures*+ classroom practice+lab practice 2+1+0	***Credit:*** 5 ***Requirement:*** tm
Course leader: Gabriella Oroszlány Dr.	**Position:** senior lecturer	***Pre-requisite:***	

Curriculum:

Description of safety, health, environmental, quality assurance and control requirements in relevant professional areas (textiles, clothing, leather). Environmental impacts of technologies, environmental issues encountered in garment manufacturing, their analysis and advanced management. Innovative examples of environmentally friendly textile technologies. Applicability of textiles of different origin, production and structure in environmental protection. Sustainability in the textile industry, ÖKO-TEX and STeP voluntary certification schemes.
General rules and regulations of waste management. Minimizing textile and leather waste, recycling, re-use options, disposal policies. Environmentally friendly leather production. Legal issues of environmental protection. Regulation, sanctions, consequences. Treatment of tannery waste water. Management of resources.

Professional competencies:

Comprehensive knowledge of the basic features and interrelations of environmental elements and systems, as well as of the environmentally harmful substances affecting them.
Knowledge of the concepts and tools of economics and environmental economics, project and environment management in environment protection.
Knowledge of major environmental technologies, equipment and structures associated with each technology, including the functioning and operation thereof.
Knowledge of the basics of energy management, options for energy production, their advantages and disadvantages, as well as the concept and feasibility options of sustainable development.
Able to cooperate with engineers involved in the development and application of production and other technologies to develop the given technology in terms of environment protection.
Able to participate creatively in engineering work based on their multidisciplinary skills, as well as to adapt to continuously changing circumstances.
Able to reveal deficiencies in the technologies applied and process risks and to initiate mitigation measures after getting familiarized with the technology concerned.
Open to professional cooperation with specialists related to their profession but involved in other areas.
Responsible proclamation and representation of the value system of the engineering profession; openness to professionally well-founded critical remarks.
Cooperation with qualified experts from other special areas (primarily economic and legal) in the course of completing professional tasks.

Literature:

1. Leather Processing & Tanning Technology Handbook, ISBN: 9788190568593
2. X. Tao: Smart Fibres, Fabrics and Clothing, 1st Edition, ISBN: 9781855735460
4. https://elearning.uni-obuda.hu/

Remark:

Title of the course: **Environmental quality management system**	***NEPTUN-code:*** RMWQM1EBNE	***Weekly classes:*** *lecture+practical work+lab work* 2+2+0	***Credit*****:** 5 ***Exam type:*** e
Course leader: González Mastrapa Henry, Dr.	***Position:*** college professor	***Required preliminary knowledge (with Neptun code):*** none	

Curriculum:

The aim of the subject is to clarify the environmental thesaurus, the concept of the management system and the basics of the systems' operation.

- Implementation and requirements of environmental managements systems according to the ISO 14001 standard
- Elements of the realization of EMS: environmental evaluations, system of environmental performance indices, environmental targets
- Elements of preparation for emergencies, documentation
- System of the European EMAS requirements in the organizational operation
- Possibilities of integrating the systems
- Risk assessments in EMS
- SPC based control of environmental parameters
- Planning and managing the process of projects aiming to improve environmental performance, project quality management

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection.
Able to take part in environment expertise, advisory, and decision preparation work.
Monitoring regulatory, technical, technological, and administrative changes related to the special field and enforcing them in their professional work.

Literature:

1. EMAS
2. ISO 14001, OHSAS 18001
3. Moodle - https://elearning.uni-obuda.hu

Name of subject: **Integrated Management Systems**	***NEPTUN-code:*** RMWIM1EBNE	***Number of hours:*** *lectures*+ classroom practice+lab practice 2+0+0	***Credit:*** 3 ***Requirement:*** tm
Course leader: Eszter Kormány, Dr.	***Position:*** senior lecturer	***Pre-requisite:*** none	

Curriculum:

Questions and tasks of Integrated Management Systems (IMS).
Elements of IMS. Integrated Management System integrates all of an organization's systems and processes in to one complete framework, enabling an organization to work as a single unit with unified objectives.
Organizations often focus on management systems individually, often in silos and sometimes even in conflict. A quality team is concerned with the QMS, often an EHS manager handles both Environmental and Health and Safety issues, etc.
Objectives and structure of ISO 9001.
The Lean and Six Sigma philosophy.

Professional competencies:

Knowledge of the methodology and legal regulations for performing environmental impact assessments and for compiling impact studies.
Open to professional cooperation with specialists related to their profession but involved in other areas.
Monitoring regulatory, technical, technological, and administrative changes related to the special field and enforcing them in their professional work.

Literature:

1. Henry Mintzberg (2005) Managers Not MBAs: A Hard Look at the Soft Practice of Managing and Management Development
2. https://elearning.uni-obuda.hu/

Remark:

Name of subject: **Informatics support of management systems**	***NEPTUN-code:*** RMWII1ABNE	***Number of hours:*** *lectures*+ classroom practice+lab practice 2+0+2	***Credit:*** 5 ***Requirement:*** tm
Course leader: Eszter Kormány, Dr.	***Position:*** senior lecturer	***Pre-requisite:*** none	

Curriculum:

Information technology (IT) is one of the fastest growing recent technology. Various software have been developed for environment and health care which are user friendly and help in better understanding for the topic. A lot of techniques are used under IT for development and application of computational tools to acquire, store, analyze and visualize satellite data which is used for observation, and protection of environment Due to the development of the internet and information through the satellites a wide database is generated which is the collection of various interrelated articles.

Professional competencies:

In possession of state-of-the-art IT skills, being able to use professional databases and certain design, modelling, and simulation software depending on their specialty.
Adequate perseverance and endurance of monotony to perform practical operations
.

Literature:

1. Thomas F. Wallace,Michael H. Kremzar: ERP: Making It Happen: The Implementers' Guide to Success with Enterprise resource Planning, 2001, JW and S. Inc.

2. https://elearning.uni-obuda.hu/

Remark:

Name of subject: **Development of management systems I.**	***NEPTUN-code:*** RMWDS1ABNE	***Number of hours:*** *lectures*+ classroom practice+lab practice 2+2+0	***Credit:*** 5 ***Requirement:*** e
Course leader: Tibor Gregász, Dr.	**Position:** associate professor	***Pre-requisite:*** none	
Curriculum:			
Introducing the fundamental tasks of creating and developing quality management and integrated management systems. The specific goal is to provide the person responsible for environmental management with the tools and methods to exploit the opportunities of a working control system			
Professional competencies:			
Knowledge of the concepts and tools of economics and environmental economics, project and environment management in environment protection. Able to perform environmental impact assessments and to participate in compiling impact studies. Adequate perseverance and endurance of monotony to perform practical operations. Efforts to solve tasks and make management decisions by being aware of the opinions of the colleagues supervised, possibly in cooperation therewith. Responsible proclamation and representation of the value system of the engineering profession; openness to professionally well-founded critical remarks.			
Literature:			
1. Henry Mintzberg (2005) Managers Not MBAs: A Hard Look at the Soft Practice of Managing and Management Development			
2. ISO 14001 and ISO 9001 standards			
2. https://elearning.uni-obuda.hu/			
Remark:			

Name of subject: **Development of management systems II.**	***NEPTUN-code:*** RMWDS2ABNE	***Number of hours:*** *lectures*+ classroom practice+lab practice 1+0+2	***Credit:*** 3 ***Requirement:*** tm
Course leader: Tibor Gregász, Dr.	**Position:** associate professor	***Pre-requisite:*** RMWDS1ABNE	

Curriculum:

Introducing the modern engineering tools of environmental company control and making students acquire the skills thereof. Introducing the implementation considerations and tasks of the system. Information systems connected to environmental decisions and their use. Designing environmentally focused systems, recording facts. The requirements of environmentally focused systems (EMAS, ISO 14001).

Professional competencies:

Knowledge of the concepts and tools of economics and environmental economics, project and environment management in environment protection.
Able to perform environmental impact assessments and to participate in compiling impact studies.
Adequate perseverance and endurance of monotony to perform practical operations.
Efforts to solve tasks and make management decisions by being aware of the opinions of the colleagues supervised, possibly in cooperation therewith.
Responsible proclamation and representation of the value system of the engineering profession; openness to professionally well-founded critical remarks.

Literature:

1. Henry Mintzberg (2005) Managers Not MBAs: A Hard Look at the Soft Practice of Managing and Management Development
2. ISO 14001 and ISO 9001 standards
2. https://elearning.uni-obuda.hu/

Remark:

Title of the course: **Environmental simulation**	***NEPTUN-code:*** RKWSI1ABNE	***Weekly teaching hours:*** *l+cw+lb* 1+0+1	***Credit*****:** 2 ***Exam type****:* tm
Course leader: Ágnes Bálint-Mészáros, Dr.	***Position:*** Associate professor	***Required preliminary knowledge:*** -	

Curriculum:

A) MODELS AND SIMULATION IN ENVIRONMENTAL SCIENCE:

History module: when to apply simulation, simulation (definitions, purposes), what is the system model experiment? The models are grouped and model types.

Classification of computer simulation, the simulation model, the general process of simulation, the types of calculations, the realization of simulation types and simulation. Numerical solution steps and the modelling workflow modelling calculations.

B) MODELLING OF ENVIRONMENTAL PROCESSES:

Characteristics of the soil-plant-atmosphere systems; soil process models, and modelling of different scales; modelling of the processes in soils, model parameters, and rating sensitivity analysis of models and results of models.

C) Capacitive crop simulation models:

The Environmental Economic Models: Structure of the crop simulation models and application of crop simulation models.

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection.
In possession of state-of-the-art IT skills, being able to use professional databases and certain design, modelling, and simulation software depending on their specialty.
Knowledge of the main methods to examine the quantity and quality features of environmental elements and systems, their typical measuring instruments and limitations thereof, as well as methods for the evaluation of data measured.
Able to take part in environment expertise, advisory, and decision preparation work.

Literature:

1. Roger McHaney: Understanding Computer Simulation, 1st edition, Roger McHaney and bookboon.com, 2009, ISBN 978-87-7681-505-9

2. Editors: Robert W. Marans, Daniel Stokols: Environmental Simulation, SBN: 978-1-4899-1142-1 (Print) 978-1-4899-1140-7 (Online), Springer Verlag, 1993

3. Miguel F. Acevedo: Simulation of Ecological and Environmental Models, August 25, 2012 by CRC Press, Textbook - 486 Pages - 265 B/W Illustrations, ISBN 9781439885062 - CAT# K13987

Comment:

Title of course: **Occupational Safety and Health**	***NEPTUN-code:*** RKEBT1EBNE	***Weekly classes:*** *lecture+workshop+lab work* 1+1+0	***Credit*****:** 3 ***Exam type:*** tm
Course leader: Lóránt Szabó, Dr.	***Position:*** senior lecturer	***Required preliminary knowledge (with Neptun code):*** ***none***	

Curriculum:

The goals of the course are to make the prospective engineers know with work conditions that is safe and not harmful for the health in order to be able diagnosing dangers and apply measures for risks reduction based on their knowledge.

The participants' rights and duty in triparty reconciliation. The concept of accidents and work accidents, the importance of investigation of work accidents. The goals, methodology and application of risk analysis of occupational safety and health (OSH). The role of ergonomics in OSH. The safe formation of work tools, dangers of maintenance, optimizing work environment in accordance with executed activity. Safety regulations for dangerous materials. Defensive capabilities of individual protective equipment that is used for reduction residual dangers of collective protection. Security technology of electricity, protection against electric shocks. Material handling and storage, security technology of pressure vessels. Concept and task of fire protection.

Professional competencies:

Knowledge of requirements and methods for health and safety, fire protection, safety engineering and remediation as related to the field of environment protection.
Able to apply in practice as well the regulations and requirements of health and safety, fire protection, and safety engineering as related to their special field.
Able to participate creatively in engineering work based on their multidisciplinary skills, as well as to adapt to continuously changing circumstances.
Able to reveal deficiencies in the technologies applied and process risks and to initiate mitigation measures after getting familiarized with the technology concerned.
Efforts to solve tasks and make management decisions by being aware of the opinions of the colleagues supervised, possibly in cooperation therewith**.**

Literature:

1. OSH directives
2. Guidance on risk assessment at work
3. Framework Directive 89/391/EEC

Megjegyzés:

Title of the course: **Basic Biotechnology**	***NEPTUN-code:*** RKWBI1ABNE	***Weekly teaching hours:*** *l+cw+lb* 2+0+0	***Credit*****:** 3 ***Exam type****:* tm
Course leader: Hosam, Bayoumi Dr	***Position:*** university private professor, associate professor	***Required preliminary knowledge:*** None	

Curriculum:

Introduction; The concept of biotechnology; Definitions of Biotechnology; Scientific integration in the area of biotechnology; applications of biotechnology. General overview of biotechnology; Processing methods in biotechnology. Definitions, the main areas of bioinformatics and their subsectors. Red Biotechnology: Red biotechnology major global development trends decisive. The biotechnology and cell therapy. The basic types of biocatalysts. Bioreactors. Application of microorganisms. Construction work for industrial microbiological (fermentation) operations. The end products of the industrial biotechnology. White Biotechnology: Environmental biotechnology. Bio-based materials, biofinomítás, Bioenergy, Bioremediation. Green Biotechnology: Technical conditions for plant biotechnology methods. Plant cells based on biotechnological processes. Biotechnology of Food Industry. Molecular Biotechnology. Genetic engineering. Nanobiotechnology: using for detection and construction of biological macromolecules.

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection.
Knowledge of the learning, knowledge acquisition, and data collection methods of the special fields of environment protection, their ethical limitations and problem solving techniques.
Comprehensive knowledge of the basic features and interrelations of environmental elements and systems, as well as of the environmentally harmful substances affecting them.
Able to cooperate with engineers involved in the development and application of production and other technologies to develop the given technology in terms of environment protection.
Able to participate creatively in engineering work based on their multidisciplinary skills, as well as to adapt to continuously changing circumstances.
Collaboration with civil organizations engaged in environment protection, but willing to argue in order to develop optimal solutions.
Constantly upgrading their knowledge of environment protection by attending organized professional development training courses.
Sharing experiences with colleagues, thus promoting their development.
Taking responsibility towards society for their decisions made in the scope of environment protection.

Literature:

- Lectures PPT
- Hallam Stevens (2016): Biotechnology and Society: An Introduction. University of Chicago Press. ISBN 022604615X, 9780226046150
- David P. Clark, Nanette J. Pazdernik (2015): Biotechnology. Second Edition Newnes.

- Sarah S. Richardson, Hallam Stevens (2015): Postgenomics: Perspectives on Biology after the Genome. Duke University Press. ISBN: 0822375443, 9780822375449.
- Venetia A. Saunders (2012): Microbial genetics applied to biotechnology: principles and techniques of gene transfer and manipulation. Springer Science & Business Media
- Molly Fitzgerald-Hayes, Frieda Reichsman (2009): DNA and Biotechnology. Academic Press
- John E. Smith (2009): Biotechnology. Cambridge University Press. ISBN: 1139476807, 9781139476805
- Cornelia Kasper, Martijn van Griensven, Ralf Pörtner (2009): Bioreactor Systems for Tissue Engineering. Springer Science & Business Media.
- Martina Newell-McGloughlin, Edward Re (2007): The Evolution of Biotechnology: From Natufians to Nanotechnology. Springer Science & Business Media, ISBN: 1402051492, 9781402051494
- Ralf Pörtner (2007): Animal Cell Biotechnology: Methods and Protocols. Springer Science & Business Media
- Colin Ratledge, Bjorn Kristiansen (2006): Basic Biotechnology. Cambridge University Press. ISBN: 0521840317, 9780521840316
- Julian Chaudhuri, Mohamed Al-Rubeai (2005): Bioreactors for Tissue Engineering: Principles, Design and Operation. Springer Science & Business Media.
- Stuart N. Isaacs (2004): Vaccinia Virus and Poxvirology: Methods and Protocols. Springer Science & Business Media

- Comment: Attendance of lectures is compulsory! Examination requirements: It is not allowed to be absence more than 4 lectures. 2 midterms with at least a pass grade (50-64 = 2%). Requirements to pass the course: Two written exams. Solve the Homework and write an assay. Term marks: 85-100%: excellent (5), 75-84%: good (4), 65-74%: satisfactory (3), 50-64%: pass (2), 0-49%: fail (1).

Environmental Public Administration specialization:

Title of the course: **Environmental aspects of settlement operation I.**	***NEPTUN-code:*** RKWTU1EBNE	***Weekly classes:*** *lecture+practical work+lab work* 2+1+0	***Credit:*** 4 ***Exam type****:* tm
Course leader: Péter Udvardy, Dr.	***Position:*** associate professor	***Required preliminary knowledge (with Neptun code): -***	

Curriculum:

The course's objectives are:

- The basics of urban elements of settlements, land use, installation characteristics, municipal infrastructure, settlement design and development.
- General presentation of public services, formation and development of public services.
- The organization of utilities and utility development, and technical infrastructure.
- Urban grid map and the use of space.
- Tasks of the municipalities related to drinking water, electricity, and gas systems.
- Maintaining the public utilities and the skills that are necessary to come to an agreement with utility providers, technical and economic analysis, environmental technologies, soil and water protection, public utilities, public works maintenance of water utilities plant, power plant utilities.

Professional competencies:

Knowledge of the concepts and tools of economics and environmental economics, project and environment management in environment protection.
Knowledge of the methodology and legal regulations for performing environmental impact assessments and for compiling impact studies.
Able to carry out assignments as environmental officer.
Taking responsibility towards society for their decisions made in the scope of environment protection.
Cooperation with qualified experts from other special areas (primarily economic and legal) in the course of completing professional tasks.

Literature:

Human Settlement Development - Volume I Editor Saskia Sassen ISBN 978-1-84826-044-3

Sustainable Preservation Practices for Managing Storage Environments Funding provided by the National Endowment for the Humanities, Division of Preservation and Access, Education & Training Grant Program

Title of the course: **Environmental aspects of settlement operation II.**	***NEPTUN-code:*** RKWTU2EBNE	***Weekly classes:*** *lecture+practical work+lab work* 2+1+0	***Credit:*** 5 ***Exam type****:* e (Written exam)
Course leader: Péter Udvardy, Dr.	***Position:*** associate professor	***Required preliminary knowledge (with Neptun code):*** RKWTU1EBNE	

Curriculum:

The second part of the subject 'Environmental Aspects of Settlement Operation' includes the following areas, taking into account the aspects of sustainability and the environmental aspects of the settlement operation:
1. urban water management, including drainage, purification and recovery options, the amount of precipitation, rainfall management, considering expected impacts of climate change, flood and inland water protection and related environmental riverbed settlement principles concerning the settlements,
2. wastewater treatment and sludge treatment strategies for small communities, in particular the possibilities of less than 2,000 population equivalents municipalities, wastewater and sludge recycling,
3. sustainable waste management tasks associated with waste.
4. municipal energetics - alternative energy supply options in the settlements.

Professional competencies:

Knowledge of the concepts and tools of economics and environmental economics, project and environment management in environment protection.
Knowledge of the methodology and legal regulations for performing environmental impact assessments and for compiling impact studies.
Able to carry out assignments as environmental officer.
Taking responsibility towards society for their decisions made in the scope of environment protection.
Cooperation with qualified experts from other special areas (primarily economic and legal) in the course of completing professional tasks.

Literature:

Paul Mac Berthouex, Linfield C. Brown: Pollution Prevention and Control ISBN 978-87-403-0773-3 bookboon.com

William P. Cunningham Mary Ann Cunningham Environmental SCIENCE A Global Concern ISBN 978–0–07–338325–5 Twelfth Edition

Title of the course: **Environmental management knowledge**	***NEPTUN-code:*** RKWOG1EBNE	***Weekly classes:*** *lecture+practical work+lab work* 1+1+0	***Credit:*** 3 ***Exam type:*** e
Course leader: Miklós Kovács, Dr.	***Position:*** master teacher	***Required preliminary knowledge (with Neptun code):*** -	

Curriculum:

The course's objectives are:

- The history of environmental management.
- The environment in the system of public administration.
- Environmental protection, nature conservation, water management, institutional systems, interfaces, management structure.
- Environmental responsibilities of local governments.
- Environmental protection system in the Constitution.
- The basic concepts and structure of environmental law, and the associated lower-level legislation.
- Law principles of the environment protection.
- Environmental official duties, and powers assigned to them.
- Conditions and the administrative authorization for the use of the environment.
- The system of responsibility in environmental protection.
- The official administrative fees of environmental conversation and protection.

Professional competencies:

Knowledge of the concepts and tools of economics and environmental economics, project and environment management in environment protection.
Able to perform public administrative and authority tasks related to environment protection after getting acquainted with the duty assigned to them.
Undertaking and authentically representing the social role of environment protection, its basic relationship with the world.
Collaboration with civil organizations engaged in environment protection, but willing to argue in order to develop optimal solutions.
Cooperation with qualified experts from other special areas (primarily economic and legal) in the course of completing professional tasks.
Monitoring regulatory, technical, technological, and administrative changes related to the special field and enforcing them in their professional work.

Literature:

Khi V. Thai, Jerrel D. Coggburn: Handbook of Globalization and the Environment – Public Administration and Policy, CRC Press Taylor & Francis Group

James L. Perry, Robert K. Christensen: Handbook of Public Administration, 3rd Edition
ISBN: 978-1-118-77555-4

Title of the course: **Community development**	***NEPTUN-code:*** RKWGT1EBNE	***Weekly classes:*** *lecture+practical work+lab work* 1+2+0	***Credit:*** 5 ***Exam type****:* tm
Course leader: Krisztina Demény Dr.	***Position:*** senior lecturer	***Required preliminary knowledge (with Neptun code):*** RKXKZ1EBNE	

Curriculum:

The course synthesizes studied objects in the foundation specialist knowledge, industry, agriculture and services, as well as the environmental impact of urbanization. It analyses the trends of the environmental impact of economic and technological development activities, and the need for sustainable use of natural resources. It deals with the concept of sustainable development, sustainability and feasibility in the interpretation of urban planning in relation to development. The course describes the concept, purpose and functions of the area and local development, including the development of basic knowledge of the settlement as well. During the semester, we will go through the stages of development of the settlements, and the most important factors in the formation of urban development history and present. International and domestic practices will be studied as well as important financial and legal tools.

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection.
Knowledge of the concepts and tools of economics and environmental economics, project and environment management in environment protection.
Able to perform public administrative and authority tasks related to environment protection after getting acquainted with the duty assigned to them.
Taking responsibility towards society for their decisions made in the scope of environment protection.
Cooperation with qualified experts from other special areas (primarily economic and legal) in the course of completing professional tasks.
Monitoring regulatory, technical, technological, and administrative changes related to the special field and enforcing them in their professional work.

Literature:

R.C.Gaur: Basic environmental engineering, New Age International Publishers. 2008 in e-learning system

Eddie N. Laboy-Nieves, Fred C. Schaffner, Ahmed Abdelhadi, Mattheus F.A. Goosen: Environmental Management, Sustainable Development and Human Health, 2008 by CRC Press, ISBN 9780415469630

Title of the course: **Environmental quality management system**	***NEPTUN-code:*** RMWQM1ABNE	***Weekly classes:*** *lecture+practical work+lab work* 2+2+0	***Credit*****:** 5 ***Exam type:*** e
Course leader: González Mastrapa Henry, Dr.	***Position:*** college professor	***Required preliminary knowledge (with Neptun code):*** none	

Curriculum:

The aim of the subject is to clarify the environmental thesaurus, the concept of the management system and the basics of the systems' operation.

- Implementation and requirements of environmental managements systems according to the ISO 14001 standard
- Elements of the realization of EMS: environmental evaluations, system of environmental performance indices, environmental targets
- Elements of preparation for emergencies, documentation
- System of the European EMAS requirements in the organizational operation
- Possibilities of integrating the systems
- Risk assessments in EMS
- SPC based control of environmental parameters
- Planning and managing the process of projects aiming to improve environmental performance, project quality management

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection.
Able to take part in environment expertise, advisory, and decision preparation work.
Monitoring regulatory, technical, technological, and administrative changes related to the special field and enforcing them in their professional work.

Literature:

1. EMAS
2. ISO 14001, OHSAS 18001
3. Moodle - https://elearning.uni-obuda.hu

Title of the course: **Informatics support for management systems**	***NEPTUN-code:*** RMWII1ABNE	***Weekly teaching hours:*** *l+cw+lb* 2+0+2	***Credit*****:** 5 ***Exam type****: tm*
Course leader: Eszter Kormány, Dr.	***Position:*** senior lecturer	***Required preliminary knowledge:*** -	

Curriculum:

Information technology (IT) is one of the fastest growing recent technology. Various software have been developed for environment and health care which are user friendly and help in better understanding for the topic. A lot of techniques are used under IT for development and application of computational tools to acquire, store, analyse and visualize satellite data which is used for observation, and protection of environment Due to the development of the internet and information through the satellites a wide database is generated which is the collection of various interrelated articles.

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection.

In possession of state-of-the-art IT skills, being able to use professional databases and certain design, modelling, and simulation software depending on their specialty.

Literature:

1. Thomas F. Wallace,Michael H. Kremzar : ERP: Making It Happen: The Implementers' Guide to Success with Enterprise resource Planning, 2001, JW and S. Inc.

2. https://elearning.uni-obuda.hu/

Comment:

Title of the course: **Disaster recovery**	***NEPTUN-code:*** RKWKA1EBNE	***Weekly teaching hours:*** *lecture+practical work+lab work* 2+0+0	***Credit:*** 4 ***Exam type****:* tm
Course leader: Andrea Paukó, Dr.	***Position:*** associate professor	***Required preliminary knowledge (with code too):*** RKEBT1EBNE	

Curriculum:

The course purpose is to prepare students to deal with tasks that are specified in Acts and knowing their application possibilities for administering natural and civilization challenges by means of public administration, and to contribute environmental security maintaining of population.

Position and role of natural and civilization disaster recovery in the state defense system. Disaster recovery structure of disaster recovery, disaster types. Legislative basis of disaster recovery. Structure and management system of disaster recovery.

Disaster recovery areas:

- Official (preventive) task of fire service and tasks of fire-fighting and damage control.
- Tasks of civil defence in elimination of emergency situations that might be developed due natural and civilization factors. Organizing and planning civil defence.
- The area of industrial security, security of critical infrastructure, industrial accident prevention, activities of hazardous materials handling, transporting hazardous commodities.

The course knowledge material besides understanding of official preventive and controlling tasks contains applicable methods for damage controlling and eliminating emergency situation also.

Professional competencies:

Knowledge of the methodology and legal regulations for performing environmental impact assessments and for compiling impact studies.
Able to perform environmental impact assessments and to participate in compiling impact studies.
Able to apply environmental remediation methods, to prepare for and participate in remediation.
Able to reveal deficiencies in the technologies applied and process risks and to initiate mitigation measures after getting familiarized with the technology concerned.
35. Performing environmental tasks individually and managing special environment protection work independently even in unexpected decision making situations.

Literature:

1. WHO Library Cataloguing-in-Publication Data Manual for the public health management
of chemical incidents, 2009. (ISBN 978-924-1598-14-9; NLM classification: WA 670)
www.who.int/environmental_health_emergencies/publications/FINAL-PHM-Chemical-Incidents_web.pdf

2. www.who.int/water_sanitation_health/hygiene/emergencies/fs2_18.pdf

3. Vijay Asar: Hazard Assessment and Risk Management Techniques for Industries, Disaster Prevention & Management Centre
Comments:

Title of the course: **Environmental Simulations**	***NEPTUN-code:*** RKWSI1ABNE	***Weekly teaching hours:*** *l+cw+lb* 1+0+1	***Credit*****:** 2 ***Exam type****:* tm
Course leader: Ágnes Bálint-Mészáros, Dr.	***Position:*** Associate professor	***Required preliminary knowledge: -***	

Curriculum:

A) MODELS AND SIMULATION IN ENVIRONMENTAL SCIENCE:

History module: when to apply simulation, simulation (definitions, purposes), what is the system model experiment? The models are grouped and model types.

Classification of computer simulation, the simulation model, the general process of simulation, the types of calculations, the realization of simulation types and simulation. Numerical solution steps and the modelling workflow modelling calculations.

B) MODELLING OF ENVIRONMENTAL PROCESSES:

Characteristics of the soil-plant-atmosphere systems; soil process models, and modelling of different scales; modelling of the processes in soils, model parameters, and rating sensitivity analysis of models and results of models.

C) Capacitive crop simulation models:

The Environmental Economic Models: Structure of the crop simulation models and application of crop simulation models.

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection.
In possession of state-of-the-art IT skills, being able to use professional databases and certain design, modelling, and simulation software depending on their specialty.
Knowledge of the main methods to examine the quantity and quality features of environmental elements and systems, their typical measuring instruments and limitations thereof, as well as methods for the evaluation of data measured.
Able to take part in environment expertise, advisory, and decision preparation work.

Literature

1. Roger McHaney: Understanding Computer Simulation, 1st edition, Roger McHaney and bookboon.com, 2009, ISBN 978-87-7681-505-9

2. Editors: Robert W. Marans, Daniel Stokols: Environmental Simulation, SBN: 978-1-4899-1142-1 (Print) 978-1-4899-1140-7 (Online), Springer Verlag, 1993

3. Miguel F. Acevedo: Simulation of Ecological and Environmental Models, August 25, 2012 by CRC Press, Textbook - 486 Pages - 265 B/W Illustrations, ISBN 9781439885062 - CAT# K13987

Comment:

Title of the course: **Proposal Writing in Theory and Practice**	***NEPTUN-code:*** RKWPA1EBNE	***Weekly classes:*** *lecture+practical work+lab work* 1+1+0	***Credit:*** 4 ***Exam type****:* tm
Course leader: Ágnes Bálint Mészárosné Dr.	***Position:*** associate professor	***Required preliminary knowledge (with Neptun code):***	

Curriculum:

This course gives students the proven techniques and skills for writing proposals in order to get the best results. The course contains a practical guide how to apply and write tenders in any field of business, in order to develop resources. This is a practical, step by step workshop where tenders from both public and private sector will be assessed and participants will have the opportunity to draft tender applications in class and have them assessed by the facilitator. Discussions will also take place with regard to current developments in this field.

The ability to write winner tenders and proposals combines strategic thinking with tactical decision making and the ability to write clear, concise and compelling documents. This practical workshop will use students' own documents and examples to improve skills, clarify students' thinking and give them increased ability to write winner tenders and proposals.

The topics will be covered are the following:

- establishing strategy: how to decide whether to apply for a tender or proposal
- the differences between tenders, proposals and expressions of interest
- getting yourself into a better position to win tenders
- reading the tender and understanding the requirements of the assessment panels
- using templates – and moving beyond them
- techniques for making your writing clear and compelling
- using visual material to make an impact
- positioning your company and offerings for maximum impact
- negotiating the parameters of the project
- balancing certainty and flexibility
- designing timelines and milestones.

During the semester, all students should choose a tender or proposal, presenting its topic and writing an application for that.

Professional competencies:

Able to solve tasks of water, soil, air, radiation, and noise protection, as well as of waste treatment and processing at proposal level; to participate in preparing decisions; to perform authority audits; and to take part in the operation of these technologies.
Able to participate in project and proposal implementation and audit tasks based on their knowledge.
Collaboration with civil organizations engaged in environment protection, but willing to argue in order to develop optimal solutions.
Open to professional cooperation with specialists related to their profession but involved in other areas.
Cooperation with qualified experts from other special areas (primarily economic and legal) in the course of completing professional tasks.

Literature:
Sandra Michie: Successful Tender Writing, ISBN: 9780864607447 Publisher: Thomson Reuters
Kristine Daw: Your Tender Response - Book 2 (Writing to Win 1) Kindle Edition Collette Beck (Editor)

Title of course: **Occupational Safety and Health**	***NEPTUN-code:*** RKEBT1EBNE	***Weekly classes:*** *lecture+workshop+lab work* 1+1+0	***Credit*****:** 3 ***Exam type:*** tm
Course leader: Lóránt Szabó, Dr.	***Position:*** senior lecturer	***Required preliminary knowledge (with Neptun code): none***	

Curriculum:

The goals of the course are to make the prospective engineers know with work conditions that is safe and not harmful for the health in order to be able diagnosing dangers and apply measures for risks reduction based on their knowledge.

The participants' rights and duty in triparty reconciliation. The concept of accidents and work accidents, the importance of investigation of work accidents. The goals, methodology and application of risk analysis of occupational safety and health (OSH). The role of ergonomics in OSH. The safe formation of work tools, dangers of maintenance, optimizing work environment in accordance with executed activity. Safety regulations for dangerous materials. Defensive capabilities of individual protective equipment that is used for reduction residual dangers of collective protection. Security technology of electricity, protection against electric shocks. Material handling and storage, security technology of pressure vessels. Concept and task of fire protection.

Professional competencies:

Knowledge of requirements and methods for health and safety, fire protection, safety engineering and remediation as related to the field of environment protection.
Able to apply in practice as well the regulations and requirements of health and safety, fire protection, and safety engineering as related to their special field.
Able to participate creatively in engineering work based on their multidisciplinary skills, as well as to adapt to continuously changing circumstances.
Able to reveal deficiencies in the technologies applied and process risks and to initiate mitigation measures after getting familiarized with the technology concerned.
Efforts to solve tasks and make management decisions by being aware of the opinions of the colleagues supervised, possibly in cooperation therewith**.**

Literature:

1. OSH directives
2. Guidance on risk assessment at work
3. Framework Directive 89/391/EEC

Megjegyzés:

Green energy specialization:

Title of the course: **The source of renewable energies I. (The application of solar energy)**	***NEPTUN-code:*** RKWMF1ABNE	***Weekly teaching hours:*** *l+cw+lb* 2+1+0	***Credit*****:** 3 ***Exam type****:* e
Course leader: Lóránt Szabó, Dr.	***Position:*** senior lecturer	***Required preliminary knowledge: -*** RKXEL1EBNE	
Curriculum:			
Basic concepts of energetics. Energy chain, energy transformation, efficiency, energy forms, renewable energy sources. Historical overview of solar energy utilization. Application of solar energy (passive and active methods). The operating principles and types of solar collectors and solar. The efficiency and the payback time of solar collectors and solar cells. Energy analysis of a small domestic solar power plant, depending on the variability of different parameters. The advantages and disadvantages of solar power plants.			
Professional competencies:			
Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection. Knowledge of the learning, knowledge acquisition, and data collection methods of the special fields of environment protection, their ethical limitations and problem solving techniques. Comprehensive knowledge of the basic features and interrelations of environmental elements and systems, as well as of the environmentally harmful substances affecting them. Knowledge of the concepts and tools of economics and environmental economics, project and environment management in environment protection. Knowledge of the basics of energy management, options for energy production, their advantages and disadvantages, as well as the concept and feasibility options of sustainable development. Able to participate in project and proposal implementation and audit tasks based on their knowledge. Able to participate creatively in engineering work based on their multidisciplinary skills, as well as to adapt to continuously changing circumstances. Able to take part in environment expertise, advisory, and decision preparation work. Monitoring regulatory, technical, technological, and administrative changes related to the special field and enforcing them in their professional work.			
Literature:			
1. Robert Gasch, Jochen Twele: Wind Power Plants: Fundamentals, Design, Construction and Operation, Springer Science & Business Media, 2011. okt. 12. - 548 pp.			
Comment:			

Title of the course: **The source of renewable energies II. (The application of wind power)**	***NEPTUN-code:*** RKWMF2ABNE	***Weekly teaching hours:*** *l+cw+lb* 2+1+0	***Credit*****:** 4 ***Exam type****:e*
Course leader: Lóránt Szabó, Dr.	***Position:*** senior lecturer	***Required preliminary knowledge:***	

Curriculum:

Repeating the basic terms of energetics. Energy chain, energy transformation, efficiency. Possibilities for application of renewable energy sources (sun and wind power). Historical overview of wind turbines. Types of wind power plants (horizontal, vertical axis). The parts and the operation of wind turbines. The calculation of the efficiency and the payback time of wind power plants. The advantages and disadvantages of wind power plants.

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection.
Knowledge of the learning, knowledge acquisition, and data collection methods of the special fields of environment protection, their ethical limitations and problem solving techniques.
Comprehensive knowledge of the basic features and interrelations of environmental elements and systems, as well as of the environmentally harmful substances affecting them.
Knowledge of the concepts and tools of economics and environmental economics, project and environment management in environment protection.
Knowledge of the basics of energy management, options for energy production, their advantages and disadvantages, as well as the concept and feasibility options of sustainable development.
Able to participate in project and proposal implementation and audit tasks based on their knowledge.
Able to participate creatively in engineering work based on their multidisciplinary skills, as well as to adapt to continuously changing circumstances.
Able to take part in environment expertise, advisory, and decision preparation work.
Efforts to improve knowledge by on-going self-education and continuously update their knowledge of the world.
Monitoring regulatory, technical, technological, and administrative changes related to the special field and enforcing them in their professional work.

Literature:

1. Michaelides, Efstathios E. Stathis: Alternative Energy Sources, ISBN 978-3-642-20951-2

Comment:

Title of the course: **The source of renewable energies III. (Geothermal, water energy)**	*NEPTUN-code:* RKWMF3ABNE	*Weekly teaching hours: l+cw+lb* 2+1+0	***Credit*:** 4 ***Exam type**:* e
Course leader: Lóránt Szabó, Dr.	***Position:*** senior lecturer	***Required preliminary knowledge: -***	

Curriculum:

The alternative energy sector is one of the most dynamically developing industries around the world. Since people are worried about the climate change, they are turning to alternative energy sources.

We are familiarizing our students with the various forms of environmentally friendly energy sources that can replace the coal, oil and gas energy sources we used so far, so that we can maintain our standard of living, but we can save our environment.

We have several alternative source of energy in the nature, e.g. geothermal energy. Another possibility is to utilize the high tide - tidal natural phenomenon for energy production.

We describe the main principle of hydrogen cells and the attempts of car manufacturers how they intend to replace the former gasoline powered and fuel oil powered cars.

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection.
Knowledge of the learning, knowledge acquisition, and data collection methods of the special fields of environment protection, their ethical limitations and problem solving techniques.
Comprehensive knowledge of the basic features and interrelations of environmental elements and systems, as well as of the environmentally harmful substances affecting them.
Knowledge of the concepts and tools of economics and environmental economics, project and environment management in environment protection.
Knowledge of the basics of energy management, options for energy production, their advantages and disadvantages, as well as the concept and feasibility options of sustainable development.
Able to participate in project and proposal implementation and audit tasks based on their knowledge.
Able to participate creatively in engineering work based on their multidisciplinary skills, as well as to adapt to continuously changing circumstances.
Able to take part in environment expertise, advisory, and decision preparation work.
Efforts to improve knowledge by on-going self-education and continuously update their knowledge of the world.
Monitoring regulatory, technical, technological, and administrative changes related to the special field and enforcing them in their professional work.

Literature:

1. Ludmilla Deines: Renewable Energies. Geothermal Energy, GRIN Verlag, 2008. 28. of May. pp.30

2. Elizabeth Raum: Water and Geothermal Energy, Heinemann-Raintree, 2008. pp. 32.

3. Edited by Detlef Stolten: Hydrogen and Fuel Cells: Fundamentals, Technologies and Applications, 2010. Wiley VCN, ISBN: 978-3-527-32711-9

Title of the course: **Biomass production and recovery**	***NEPTUN-code:*** RKWMU1EBNE	***Weekly teaching hours:*** *l+cw+lb* 2+1+0	***Credit*****:** 5 ***Exam type****:* e
Course leader: Imre Biczó, Dr.	***Position:*** master teacher	***Required preliminary knowledge:*** -	
Curriculum:			
During the semester all biomass raw materials that are used energetically in domestic and / or foreign biomass power plants will be presented. One of these is herbaceous and woody plants grown specifically for biomass use. These raw materials cover not only the basic aspects of cultivation, but also other environmental technology linkages such as brownfield revitalization, phytoremediation, etc. Wastes that can be used as biomass feedstock, waste from the biological industries, and rdf and srf from the fraction of municipal waste sorting, as feedstock for biomass and / or power plant boilers, or from so-called municipal waste. Raw materials for the "dry" biogas process will be presented in the second half of the semester. The standards, legal requirements and technical aspects of these materials as well as the technological and organizational aspects of production will also be introduced during the course. In addition to the main mechanical / mechanical parameters of each type of biomass firing equipment, the course material is detailed along with the main material groups.			
Professional competencies:			
Knowledge of the learning, knowledge acquisition, and data collection methods of the special fields of environment protection, their ethical limitations and problem solving techniques. Knowledge of the basics of energy management, options for energy production, their advantages and disadvantages, as well as the concept and feasibility options of sustainable development. Able to participate creatively in engineering work based on their multidisciplinary skills, as well as to adapt to continuously changing circumstances.			
Literature:			
1.Erik Dahlquist: Biomass as Energy Source: Resources, Systems and Applications, March 31, 2017 by CRC Press, Reference - 300 Pages, ISBN 9781138073227 - CAT# K33885			
Comment:			

Title of the course: **Alternative energy usage in practice I. (System of energetics – transport, residential application)**	***NEPTUN-code:*** RKWAE1EBNE	***Weekly teaching hours:*** *l+cw+lb* 2+2+0	***Credit*****:** 6 ***Exam type****:* e
Course leader: Konrád Lájer Dr.	***Position:*** associate professor	***Required preliminary knowledge:*** -	

Curriculum:

The purpose of the subject is to introduce alternative energy conversion drives used in transport. (LPG, CNG, hydrogen, electric drives). During the semester, students conduct an environmental risk assessment of each drive. They will learn the interactive control options that coordinate transport systems (eg public transport alternatives; 'self-driving vehicles'; 'smart' roads). It also describes the principles of operation of additional transport related infrastructures. (Street lighting ("Smart" lighting, traffic control).

Within the framework of the course, the modern energy management capabilities of household appliances and the benefits of networked equipment (eg IOT [Internet of Things] application technology) are introduced.

The course has the task of developing attitudes as well as learning about economics calculations used in practice.

Professional competencies:

Knowledge of the concepts and tools of economics and environmental economics, project and environment management in environment protection.
Knowledge of major environmental technologies, equipment and structures associated with each technology, including the functioning and operation thereof.
Knowledge of the basics of energy management, options for energy production, their advantages and disadvantages, as well as the concept and feasibility options of sustainable development.
Able to participate in project and proposal implementation and audit tasks based on their knowledge.
Able to participate creatively in engineering work based on their multidisciplinary skills, as well as to adapt to continuously changing circumstances.

Literature:

1. Eds.: Management Association, Renewable and Alternative Energy: Concepts, Methodologies, Tools, and Applications, IGI Global, 2016, ISBN13: 9781522516712

2. Editor-in-Chiefs: Ali Sayigh: Comprehensive Renewable Energy, 1st Edition, Imprint: Elsevier, Published Date: 2nd May 2012, Page Count: 4422, eBook ISBN: 9780080878737, Hardcover ISBN: 9780080878720

3. Michaelides, Efstathios E. Stathis: Alternative Energy Sources, Springer Press, 2012, Buy eBook, ISBN: 978-3-642-20951-2

Comment:

Title of the course: **Alternative energy usage in practice II. (System of energetic-Building energy)**	***NEPTUN-code:*** RKWAE2EBNE	***Weekly teaching hours:*** *l+cw+lb* 2+2+0	***Credit*****:** 6 ***Exam type****:* e
Course leader: ***Konrád Lájer Dr.***	***Position:*** associate professor	***Required preliminary knowledge:*** -	

Curriculum:

The aim of the course is to give students an insight into the relationships between the built environment and the natural environment, and to give human ecology a place in the training. Learn about the architectural methods that can have a positive effect on the microclimate of the settlements. Discover the relationship between the home and the human environment as they develop / develop their ecological approach. The passive house and all the solutions aimed at lowering energy consumption eg. modern home heating and heating. air-conditioning methods, materials and techniques of thermal insulation of apartments.

Professional competencies:

Knowledge of major environmental technologies, equipment and structures associated with each technology, including the functioning and operation thereof.
Knowledge of the basics of energy management, options for energy production, their advantages and disadvantages, as well as the concept and feasibility options of sustainable development.
Able to perform public administrative and authority tasks related to environment protection after getting acquainted with the duty assigned to them.

Literature:

1. Eds.: Management Association, Renewable and Alternative Energy: Concepts, Methodologies, Tools, and Applications, IGI Global, 2016, ISBN13: 9781522516712

2. Editor-in-Chiefs: Ali Sayigh: Comprehensive Renewable Energy, 1st Edition, Imprint: Elsevier, Published Date: 2nd May 2012, Page Count: 4422, eBook ISBN: 9780080878737, Hardcover ISBN: 9780080878720

3. Michaelides, Efstathios E. Stathis: Alternative Energy Sources, Springer Press, 2012, Buy eBook, ISBN: 978-3-642-20951-2

Comment:

Title of the course: **Environmental Simulations**	***NEPTUN-code:*** RKWSI1ABNE	***Weekly teaching hours:*** *l+cw+lb* 1+0+1	***Credit*****:** 2 ***Exam type****:* tm
Course leader: Ágnes Bálint-Mészáros, Dr.	***Position:*** associate professor	***Required preliminary knowledge: -***	

Curriculum:

A) MODELS AND SIMULATION IN ENVIRONMENTAL SCIENCE:

History module: when to apply simulation, simulation (definitions, purposes), what is the system model experiment? The models are grouped and model types.

Classification of computer simulation, the simulation model, the general process of simulation, the types of calculations, the realization of simulation types and simulation. Numerical solution steps and the modelling workflow modelling calculations.

B) MODELLING OF ENVIRONMENTAL PROCESSES:

Characteristics of the soil-plant-atmosphere systems; soil process models, and modelling of different scales; modelling of the processes in soils, model parameters, and rating sensitivity analysis of models and results of models.

C) Capacitive crop simulation models:

The Environmental Economic Models: Structure of the crop simulation models and application of crop simulation models.

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection.
In possession of state-of-the-art IT skills, being able to use professional databases and certain design, modelling, and simulation software depending on their specialty.
Knowledge of the main methods to examine the quantity and quality features of environmental elements and systems, their typical measuring instruments and limitations thereof, as well as methods for the evaluation of data measured.

Literature:

1. Roger McHaney: Understanding Computer Simulation, 1st edition, Roger McHaney and bookboon.com, 2009, ISBN 978-87-7681-505-9

2. Editors: Robert W. Marans, Daniel Stokols: Environmental Simulation, SBN: 978-1-4899-1142-1 (Print) 978-1-4899-1140-7 (Online), Springer Verlag, 1993

3. Miguel F. Acevedo: Simulation of Ecological and Environmental Models, August 25, 2012 by CRC Press, Textbook - 486 Pages - 265 B/W Illustrations, ISBN 9781439885062 - CAT# K13987

Comment:

Title of the course: **Basic Biotechnology**	***NEPTUN-code:*** RKWBI1ABNE	***Weekly teaching hours:*** *l+cw+lb* 2+0+0	***Credit*****:** 3 ***Exam type****:* tm
Course leader: Hosam, Bayoumi Dr	***Position:*** university private professor, associate professor	***Required preliminary knowledge:*** None	

Curriculum:

Introduction; The concept of biotechnology; Definitions of Biotechnology; Scientific integration in the area of biotechnology; applications of biotechnology. General overview of biotechnology; Processing methods in biotechnology. Definitions, the main areas of bioinformatics and their subsectors. Red Biotechnology: Red biotechnology major global development trends decisive. The biotechnology and cell therapy. The basic types of biocatalysts. Bioreactors. Application of microorganisms. Construction work for industrial microbiological (fermentation) operations. The end products of the industrial biotechnology. White Biotechnology: Environmental biotechnology. Bio-based materials, biofinomítás, Bioenergy, Bioremediation. Green Biotechnology: Technical conditions for plant biotechnology methods. Plant cells based on biotechnological processes. Biotechnology of Food Industry. Molecular Biotechnology. Genetic engineering. Nanobiotechnology: using for detection and construction of biological macromolecules.

Professional competencies:

Knowledge of general and specific mathematical, natural and social scientific principles, rules, relations, and procedures as required to pursue activities in the special field of environment protection.
Knowledge of the learning, knowledge acquisition, and data collection methods of the special fields of environment protection, their ethical limitations and problem solving techniques.
Comprehensive knowledge of the basic features and interrelations of environmental elements and systems, as well as of the environmentally harmful substances affecting them.
Able to cooperate with engineers involved in the development and application of production and other technologies to develop the given technology in terms of environment protection.
Able to participate creatively in engineering work based on their multidisciplinary skills, as well as to adapt to continuously changing circumstances.
Collaboration with civil organizations engaged in environment protection, but willing to argue in order to develop optimal solutions.
Constantly upgrading their knowledge of environment protection by attending organized professional development training courses.
Sharing experiences with colleagues, thus promoting their development.
Taking responsibility towards society for their decisions made in the scope of environment protection.

Literature:

- Lectures PPT
- Hallam Stevens (2016): Biotechnology and Society: An Introduction. University of Chicago Press. ISBN 022604615X, 9780226046150
- David P. Clark, Nanette J. Pazdernik (2015): Biotechnology. Second Edition Newnes.

- Sarah S. Richardson, Hallam Stevens (2015): Postgenomics: Perspectives on Biology after the Genome. Duke University Press. ISBN: 0822375443, 9780822375449.
- Venetia A. Saunders (2012): Microbial genetics applied to biotechnology: principles and techniques of gene transfer and manipulation. Springer Science & Business Media
- Molly Fitzgerald-Hayes, Frieda Reichsman (2009): DNA and Biotechnology. Academic Press
- John E. Smith (2009): Biotechnology. Cambridge University Press. ISBN: 1139476807, 9781139476805
- Cornelia Kasper, Martijn van Griensven, Ralf Pörtner (2009): Bioreactor Systems for Tissue Engineering. Springer Science & Business Media.
- Martina Newell-McGloughlin, Edward Re (2007): The Evolution of Biotechnology: From Natufians to Nanotechnology. Springer Science & Business Media, ISBN: 1402051492, 9781402051494
- Ralf Pörtner (2007): Animal Cell Biotechnology: Methods and Protocols. Springer Science & Business Media
- Colin Ratledge, Bjorn Kristiansen (2006): Basic Biotechnology. Cambridge University Press. ISBN: 0521840317, 9780521840316
- Julian Chaudhuri, Mohamed Al-Rubeai (2005): Bioreactors for Tissue Engineering: Principles, Design and Operation. Springer Science & Business Media.
- Stuart N. Isaacs (2004): Vaccinia Virus and Poxvirology: Methods and Protocols. Springer Science & Business Media

- Comment: Attendance of lectures is compulsory! Examination requirements: It is not allowed to be absence more than 4 lectures. 2 midterms with at least a pass grade (50-64 = 2%). Requirements to pass the course: Two written exams. Solve the Homework and write an assay. Term marks: 85-100%: excellent (5), 75-84%: good (4), 65-74%: satisfactory (3), 50-64%: pass (2), 0-49%: fail (1).

Title of the course: **Basic of energetics**	***NEPTUN-code:*** RKWEG1EBNE	***Weekly teaching hours:*** *l+cw+lb* 2+1+0	***Credit*****:** 4 ***Exam type****:* tm
Course leader: Konrád Lájer, Dr.	***Position:*** associate professor	***Required preliminary knowledge:*** RKXEL1EBNE	

Curriculum:

The principle and possibilities of electricity production in a traditional and alternative way.

Discussing and demonstrating the individual structural elements.

Operation of electric generators.

Basic energy solutions to connect with renewable systems.

Temporary energy storage.

Professional competencies:

Knowledge of the concepts and tools of economics and environmental economics, project and environment management in environment protection.

Knowledge of major environmental technologies, equipment and structures associated with each technology, including the functioning and operation thereof.

Knowledge of the basics of energy management, options for energy production, their advantages and disadvantages, as well as the concept and feasibility options of sustainable development.

Able to participate in project and proposal implementation and audit tasks based on their knowledge.

Able to participate creatively in engineering work based on their multidisciplinary skills, as well as to adapt to continuously changing circumstances.

Literature:

1. Vaclav Smil: Energy in Nature and Society: General Energetics of Complex Systems (MIT Press) First Edition (1st printing) Edition, ISBN-13: 978-0262693561; ISBN-10: 0262693569

Comment:

Title of course: **Occupational Safety and Health**	***NEPTUN-code:*** RKEBT1EBNE	***Weekly classes:*** *lecture+workshop+lab work* 1+1+0	***Credit*****:** 3 ***Exam type:*** tm
Course leader: Lóránt Szabó, Dr.	***Position:*** senior lecturer	***Required preliminary knowledge (with Neptun code):*** ***none***	

Curriculum:

The goals of the course are to make the prospective engineers know with work conditions that is safe and not harmful for the health in order to be able diagnosing dangers and apply measures for risks reduction based on their knowledge.

The participants' rights and duty in triparty reconciliation. The concept of accidents and work accidents, the importance of investigation of work accidents. The goals, methodology and application of risk analysis of occupational safety and health (OSH). The role of ergonomics in OSH. The safe formation of work tools, dangers of maintenance, optimizing work environment in accordance with executed activity. Safety regulations for dangerous materials. Defensive capabilities of individual protective equipment that is used for reduction residual dangers of collective protection. Security technology of electricity, protection against electric shocks. Material handling and storage, security technology of pressure vessels. Concept and task of fire protection.

Professional competencies:

Knowledge of requirements and methods for health and safety, fire protection, safety engineering and remediation as related to the field of environment protection.
Able to apply in practice as well the regulations and requirements of health and safety, fire protection, and safety engineering as related to their special field.
Able to participate creatively in engineering work based on their multidisciplinary skills, as well as to adapt to continuously changing circumstances.
Able to reveal deficiencies in the technologies applied and process risks and to initiate mitigation measures after getting familiarized with the technology concerned.
Efforts to solve tasks and make management decisions by being aware of the opinions of the colleagues supervised, possibly in cooperation therewith**.**

Literature:

1. OSH directives
2. Guidance on risk assessment at work
3. Framework Directive 89/391/EEC

Megjegyzés: