

Code	Course name		Degree level	Year of study	Sem.	Course type	Language	Tutorial basis (yes/no;
								language)
NME8321	Energetic resources and the environment	5	Master	2 nd	1 st	Mandatory	English	No
Course description	The course on Energy resources and the environment offers the students a holistic view on the complex relation between identification, extraction and use of energy resources, and the environment on the other side. The conventional sources of energy are examined, in terms of geological occurrence, geographical distribution, extraction procedures, and use. At the same time, a short introduction to the unconventional energy resources is given, in terms of distribution, current and future potential, weight in the world energy balance, costs, environmental impact. This discipline focuses on the improvement of the students' capacity to operate with complex notions, to apply the knowledge and abilities to systems that include natural and anthropogenic components, costs, use, and environmental issues, and on understanding the global scale issues that affect the energy resources.							
Learning Outcomes	By the end of the course, the students will be able to understand the main issues of the energy resources management at a global scale, the geological and geographical elements of the conventional energy resources at a global scale, the correlation between energy resources exploitation and the environmental effects at a local and global scale, and the future perspectives and actions for a better energy. They will also study the global competition for resources and the links to economy and politics							
Evaluation	exam 60% + continuous evalua	ation 409	%					
Additional	http://enviro.ubbcluj.ro/wp-content/uploads/2015/10/An-II_Fisa-disciplinei_Resurse-energ-							
information	mediu_2019_20EN.pdf							
NME8121	contaminated sites	5	Master	2 nd	1 st	Mandatory	English	No
Course description	The course Management of contaminated sites provides an overall image regarding the management issues generated by contaminated sites (the investigation methodology, the goal, the politic and regulatory framework and the remediation aspects). The course consists of a comparative analysis of them, presenting a basic remediation technology for contaminated sites. This course focuses on the current politics and legislation in this field, in Romania, EU and USA, on the main management methodologies for contaminated sites applied at national level and on the several decision support systems, which have the goal to provide proper strategies for contaminated sites rehabilitation, and evaluation of the risk assessment concept in the context of contaminated sites.							
Learning Outcomes	The participants to the course will achieve the level of knowledge necessary in order be able to understand contaminated sites management, the environmental legislation related to contaminated sites and they will acquire the ability to use the assessment methodology and remediation of contaminated sites for depollution. At the same time, students will develop: analytical abilities by assessing complex contamination situations and proposal of appropriate solutions for decontaminated analytical abilities for environmental issues management generated by the presence of contaminated sites.							
Evaluation	Oral- involvement in discussion regular session) 70% + Oral – p	ns and tl presenta	he quality o tion of proj	f the que ects mad	stions as e individ	sked. 10% + W lual/in teams 2	/ritten exam 20%	(in the
Additional information	http://enviro.ubbcluj.ro/wp-co contaminate NME-8121 mas	ontent/u ter-DSM	iploads/201 M 2019-20	.5/10/An 20 EN.pd	- <u>II_FD_N</u> df	lanagementu	-siturilor-	
NME8021	Waste management, treatment and recovery	5	Master	2 nd	1 st	Mandatory	English	No
Course description	The course is focused to provide the theoretical and practical knowledge in the field of waste management: waste collection, transport, treatment, recovery, recycling, composting and disposal of							



	waste in order to reduce the environmental impact. Analysis of the urban waste management process is							
	management in industry and in other economic branches.							
	Students attending this course will be able to link national legislation with EU law transposition of the							
Learning	Directive CE98/2008 into Law	211/20	11. under v	vhich eac	h comp	anv must app	oint a perso	n responsible
Outcomes	for waste management under new European environmental principles.							
Evaluation	Seminar activity 25% + Project	present	iation 25% +	+ written	exam 50	1%		
Additional	http://enviro.ubbcluj.ro/stude	nti-mas	ter/dezvolta	area-suste	enabila-s	si-managemer	ntul-mediului	i-invatamant-
information	<u>cu-frecventa/</u>							
	Eco-responsible							
NME8221	entrepreneurship and	5	Master	2 nd	1 st	Mandatory	English	No
	negotiation tactics							
Course	The course aims to provide st	udents	with the ba	sic inforn	nation o	n ecological n	narketing an	d negotiation
description	abilities. The course provides	s knowl	edge on co	ollecting,	process	ing and anal	ysing data r	egarding the
•	interaction between a compar	iy/an or	ganisation a	ind exteri	nal envir	onment.		• •
Looming	Students attending this course	e will be	e trained in	the appl		of professiona	al ethics prin	cipies, norms
Learning	and values within one sown r	igorous,	effective al	na respor	toom on	ork strategies.	Also, they w	VIII be trained
Outcomes	to identify the foles and respo		s III a IIIuitis order to be	specially	iean an	division of a c	ng various re	rganisation
Evaluation	Seminar activity 10% + Tests/	nroiects	during the	semester	30% + F	inal examinat	ion 60%	
Additional		projects	during the .	Semester	50/0 1			
information	http://enviro.ubbcluj.ro/wp-co	ontent/L	ploads/201	<u>.5/10/AN</u>	-II_Gree	n-marketing-a	nd-N.pdf	
NMF8022	Computer-aided design for	7	Master	2 nd	7 nd	Mandatory	English	No
	environmental protection	,	IVIASLEI	2	2	Wandatory	Linghish	NO
	environmental protection The general objective of the c	liscipline	e is to provi	de gener	al know	edge related	to concepts	and methods
	environmental protection The general objective of the c applied in the area of compu	liscipline ter desi	e is to provi gn, to intro	de gener	al knowl	edge related	to concepts to computer	and methods aided design
Course	environmental protection The general objective of the c applied in the area of compu documentation necessary for	liscipline ter desi the ge	e is to provi gn, to intro nerating te	de gener duce bas chnical d	al knowl ic eleme Irawings	edge related ents specific t . The discipli	to concepts to computer the helps the	and methods aided design e students to
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Course description Learning Outcomes Evaluation Additional information	environmental protection The general objective of the of applied in the area of compu- documentation necessary for acquire theoretical knowledge for engineers. At the same to representations at different so descriptive geometry and tech By the end of the semester, professional manner on issues fundamental engineering condor same time, they can develop to solve graphic problems. Stude specific notions related to tech to present drawings, sketchess Evaluation of the research rep Evaluation of the project (docu preparation of the tasks. Stude http://enviro.ubbcluj.ro/wp-cod environmental-protection-DSN Ethics, techniques of communication and academic writing	discipline ter desi the ge on prir ime, it f cales, a inical gra the stud s related cepts rel eamwor nts can hnical du and eng ort (a wi umentat ents are ontent/u <u>MM-2.pc</u>	e is to provi gn, to intro nerating te focuses on nd on apply aphic design dents will a to technica ated to spe k abilities, t explain and esign in con ineering pro- ritten paper cion and der rewarded for uploads/201	de gener duce bas chnical d eral conce the deve ying the acquire co al design. crific issue hink relat interpre- inection v ojects wit and an co monstration or bringin .5/10/An- 2 nd	al knowl ic eleme ic eleme lrawings epts and elopmen concept ommunie They wi es conce tionally a t proper with fun- h specifi oral prese on) 60% g up mo -II-Fisa-d	edge related ents specific t . The disciplin l basic rules o t of technical s related the cation skills to cation skills to runing environ and find concr ties, concepts damental scie to engineeri entation) 30% o + Participatic ore challenging isciplina-Com	to concepts to computer ne helps the f technical g skills to acl work techni to interact eff to apply mode mental protecte te ways to a , approaches nces and enging areas. + on in discussi g ideas. 10% puter-aided- English	and methods aided design e students to raphic design hieve graphic ques used in fectively in a dels, theories, ection. At the approach and gineering and ons, debates, design-for- No



description	according to the academic integrity and ethics principles, with an emphasis on professional specialized content. Therefore, the students will be trained to develop their research abilities in a foreign language in							
	order to gain the ability to operate with all the linguistic structures required in the domain of expertise.							
	Graduates will have the ability to understand the professional roles and contexts, to use the oral and							
Learning	written communication conve	entions i	in terms of	receptive	e skills (reading/listen	ing) and pro	oductive skills
Outcomes	(writing/speaking). Also, the	ability	to use effi	ciently a	ll the ir	ntellectual ins	truments, r	esources and
outcomes	communication techniques a	nd to a	adopt the r	ight lear	ning str	ategies accor	ding to the	professional
	context are objectives of the c	context are objectives of the course.						
Evaluation	The elaboration of an academi	ic article	40% + Oral	exam 60	%			
Additional	http://enviro.ubbcluj.ro/stude	nti-mast	ter/dezvolta	area-suste	enabila-s	si-managemer	ntul-mediulu	<u>i-invatamant-</u>
information	<u>cu-frecventa/</u>							
NME8322	Assessment of ecosystem services	5	Master	2 nd	2 nd	Mandatory	English	No
	The content of the course ta	akes into	o account t	he traini	ng neec	ls of students	s as future	pre-university
	teachers as well as those invo	lved in	nature cons	servation	and the	developmen	t of strategie	es for cultural
Course	landscapes. Based on these	argumer	nts, the co	urse prov	vides kn	owledge and	understand	ing of social-
description	ecological systems, their eco	system	service sup	ply and	the role	e of ecosyster	m services i	n sustainable
	development. Thus, the stude	ents are	trained to	develop	strategi	c and researc	h projects to	o address the
	ecosystem service supply and	manage	ment in hui	man mod	ified lan	dscapes. Disc	ussion on co	nflicts around
	ecosystem services in numan of		ed landscap	es is also	part of	the course.		
	Attending this course, the gra	duates \	will underst	and the i		cosystem ser	vices in the i	resilience and
Loorning	biodiversity econytem convic		landscapes,	, the typ	es or go	overnance and	a their relev	ance for the
Quitcomos	for the governance of human	e suppiy	dilu tile at	ac and a	cosyster	is and typolog		e of scenarios
Outcomes	landscapes in Europe Also	they wi	ill gain kno	wledge o	on the	concept of h	iocultural re	fugia and its
	applicability in the understand	ling of ci	iltural lands	scanes in	Romania	Europe and	other narts (of the world
Evaluation	Attendance and feed-back provided at seminars 20% + Written exam 80%							
Additional	http://enviro.ubbcluj.ro/stude	enti-mast	ter/dezvolta	area-suste	enabila-s	si-managemer	ntul-mediulu	i-invatamant-
information	<u>cu-frecventa/</u>							
	Advanced methods in							
NME6412	collecting of environmental	6	Master	1 st	2 nd	Mandatory	English	No
	samples							
Course	The general objective of the di	iscipline	is to acquir	e knowle	dge on a	series of ana	lytical techni	ques for
description	sampling and processing of en	vironme	ental sample	es, applica	able for t	the determina	tion of chem	nical
	compounds in the form of trac	es from	various env	vironmen	tal facto	rs.		
	Knowledge, understanding, an	alysis ar	nd applicatio	on in inte	r- and tr	ans-disciplina	ry perspectiv	ves, of
	phenomena and processes related to advanced and ultra-performing analytical separation techniques for							
	investigating the quality of the environment. • Ability to choose relevant and contextualized methods of							
Learning	analytical methods / technique	es / optil	mizations in	strict ac	cordance	e with the con	crete situati	ons and
Outcomes	available resources. • Determi	nation o	of concentra	tion level	is of che	mical pollutar	its, with an e	emphasis on
	nazardous chemical compound	us at the	trace level	• Choos	ing the r	nost appropria	ate techniqu	es for taking
	Acquisition of extremely useful	naing on	the poliuta	nts and t	ne envin a datarm	onmental com	ipartments c	concerned.
	advanced separation technique		ai skills feld	ieu lo th	e uetern	Infation of che	enncar ponut	ants through
		C).	o from or-	Vorifice+	on toot-	450/		
Evaluation	Course: exam 55% + Seminars:	: portfoli	to trom oral	verificati	on tests	45%		
Additional	http://enviro.ubbcluj.ro/wp-co	<u>ontent/u</u>	iploads/201	.8/11/Me	tode-av	ansate-in-prel	evarea-si-pr	egatirea-



information	probelor-de-mediu M-CMSE	Beldean	-Simion 20	18-04.pd	f			
	Modeling and simulation of			a st	and		E 111	
NMX8412	chemical accidents	4	Master	1*	2114	Optional	English	No
Course description	The course is focused to bring knowledge of mathematical models used for the estimation of physical effects of chemical accidents and release of dangerous substances. Specific software in the field of environmental risk and impact assessment are used in the learning process. Also, the students will be prepared for the development of environmental risk or impact studies.							
Learning Outcomes	The knowledge acquired during the course can be used in the next domains: environment protection, process industries: chemical, pharmaceutical, petrochemical, food industry etc. and academic domains. The graduates of this course can contribute in the development of technological risk studies, safety reports or a major industrial accidents prevention policies. Also, they can work in consultancy in the field of risk assessment.							
Evaluation	Student activity 5% + Evaluation the research report (a written	on of the paper o	e project (do f about 10 p	ocumenta pages and	ition and I an oral	demonstrati	on) 60% + Ev) 30%	aluation of
Additional	http://enviro.ubbcluj.ro/stude	enti-mas	ter/dezvolta	area-sust	enabila-	si-manageme	ntul-mediulu	i-invatamant-
information	<u>cu-frecventa/</u>							
NMX8912	Assessment and analysis procedures in ecological	4	Master	1 st	2 nd	Optional	Romanian	No
Course description Learning	The course aims to provide students with knowledge in the fields of ecological management and ecosystem assessment. Database structures and analytical procedures are being used in the teaching process, together with the main software packages used in the field of ecological management. Field work for gathering data for ecological assessment and analyses is included in the curricula.							
Outcomes	and to the elaboration of the scientific research programs for biodiversity conservation.							
Evaluation	Student activity 5% + Project presentation 15% + Written exam 80%							
Additional	http://enviro.ubbcluj.ro/stude	enti-mas	ter/dezvolta	area-sust	enabila-	si-manageme	<u>ntul-mediulu</u>	i-invatamant-
information	<u>cu-frecventa/</u>					I		I
NMX8521	LIDAR system	4	Master	2 nd	1 st	Optional	English	No
Course description	The proposed course helps the students acquire expertise regarding concepts, methodologies and techniques used in environmental data acquisition and LIDAR remote sensing. The course focuses on theoretical background regarding data acquisition and remote sensing. It provides hands-on expertise in the use of LIDAR systems and remote sensing instrumentation, and helps the students integrate different types of environmental data in order to better characterize environmental factors.							
Learning Outcomes	At the end of the course, the students will acquire the ability to understand the concepts, methods and models used in environmental data acquisition and remote sensing, the composition of the atmosphere and its dynamics, the radiative transfer through the atmosphere and the basic meteorological aspects. Moreover, it presents the principles of active and passive remote sensing, the basic operation of LIDAR while the students will learn to derive microphysical properties of particles from optical ones and to use trajectory models for particle dynamics.							
Evaluation	Colloquium 50% + Public prese	entation	50%					
Additional information	http://enviro.ubbcluj.ro/wp-co 2 LIDAR systems DSMM_Ajta	ontent/u ai_en_2	uploads/201 019-2020-1.	.5/10/AN .pdf	-II_Optio	onal-courses-r	<u>10</u>	
NME6321	Population protection against supertoxic chemical	5	Master	2 nd	1 st	Optional	English	No



	agents							
Course description	The course is based on understanding, analysing and working with advanced analytical techniques for assessment of environmental quality, focusing on HAZMAT and CBRN compounds. During the course, the students will be taught to determine the concentration of chemical pollutants, especially dangerous supertoxic chemical compounds. Planning, preparation and response of population exposure to supertoxic chemical agents and biological ones are part of the course.							
Learning Outcomes	The goal of the course is to gain knowledge in population protection against supertoxic chemical and biological agents: recognising the main threats, planning and organizing response to CBRN (chemical, bacteriological, radiologic and nuclear) or HAZMAT (dangerous materials, toxic industrial compounds – TIC) incidents. Using advanced analytical techniques, photoionization detections (PID) and ion mobility spectrometry (IMS), is planned for students to develop primary field assessment of incidents. At the end of the course knowledge of decontamination methods and techniques will be gained							
Evaluation	Student activity and project pr	esentati	ion 40% + C	olloquiun	n 60%			
Additional information	http://enviro.ubbcluj.ro/stude cu-frecventa/	enti-mas	ter/dezvolta	area-suste	enabila-s	si-managemer	ntul-mediulu	i-invatamant-
NME8821	Specialised communication strategies	5	Master	2 nd	1 st	Optional	English	No
Course description	The aim of the course is to develop the students' communication abilities in terms of specialized language, according to the academic integrity and ethics principles, with an emphasis on professional communication requirements. The students will be trained to develop professional responsibilities in order gain the ability to operate with all the linguistic structures required in the domain of expertise.							
Learning Outcomes	Graduates will be able to develop specialised communication abilities, will enhance their research abilities in a foreign language and will be able to deliver research in accordance with the academic integrity principles. Thus, they will master all the necessary communication techniques at an academic level.							
Evaluation	The elaboration of an applicat	ion file 4	10% + Oral e	xam 60%				
Additional information	http://enviro.ubbcluj.ro/wp-co	ontent/u	uploads/201	<u>5/07/Stra</u>	ategii-co	municational	e.pdf	
NME8521	Dosimetric techniques in environmental studies and radioprotection training.	4	Master	2 nd	1 st	Optional	English	No
Course description	This course will provide students with knowledge on: environmental radioactivity of natural and artificial origin, the potential applications of background radioactivity in environmental studies, the peaceful use o radioactive sources, nuclear regulations and legislation, the effects of ionizing radiations on living beings and the risk associated with exposure to sources of radioactivity in the environment.							
Learning Outcomes	 The outcomes are: Knowing the sources of decay and types of radio decay and types of the se areas Gaining knowledge on the second decay and types of the second	of nuclea diation s of hum pathway netry umente tion on the ra	ar radiation han and othe rs of radionu d opinion of adioactive c other appli	in the env er biota e iclide's m n the adva ontamina cations o	vironme xposure igration antages ited site f enviror	nt. Understan to nuclear rad in the environ as well as the s and the pote	ding the basi diation in the nment and e risks associa ential remedi activity to er	is of nuclear cosystems ted with iation of



	studies such as radioactive dating methods.
Evaluation	Course paper – 3p, course exam – 3p, seminar activities – 3p
Additional	http://enviro.ubbcluj.ro/wp-content/uploads/2015/07/Tehnici-dozimetrice-in-studiul-mediului-si-notiuni-
information	de-radioprotectie.pdf