

Add. 3		Course program for the second level (second cycle - postgraduate) of studies			
1.	Course title	Environmental Systems Analysis			
2.	Code	1M5SEE06			
3.	Study group(s)	SEE			
4.	The organizer of the study program (unit, institute, department)	"Ss. Cyril and Methodius" University in Skopje, Faculty of Mechanical Engineering – Skopje			
5.	Level (first, second, third)	Second			
6.	Academic year / semester	V / winter	7.	ECTS credits	6
8.	Professor	Prof. dr. Atanasko Tuneski			
9.	Prerequisites	None			
10.	<p>Course objectives (competences):</p> <p>Acquire knowledge of:</p> <ul style="list-style-type: none"> - Eleven environmental systems analysis tools: environmental impact assessment (EIA), strategic environmental assessment (SEA), life cycle assessment (LCA), positional analysis (PA), cost-benefit analysis (CBA), material intensity per unit service (MIPS) analysis, total material requirement (TMR) analysis, ecological footprint (EF), exergy analysis, energy analysis and risk assessment (RA) for chemicals. - Case study where different environmental systems analysis tools are implemented. 				
11.	<p>Course content:</p> <p>DESCRIPTION OF THE ENVIRONMENTAL SYSTEMS ANALYSIS TOOLS. Selecting questions and tools. Environmental Impact Assessment (EIA). Strategic Environmental Assessment (SEA). Life Cycle Assessment (LCA). Positional Analysis (PA). Cost-Benefit Analysis (CBA). Material Intensity per Unit Service (MIPS). Total Material Requirement (TMR). Ecological Footprint (EF). Exergy analysis. Energy analysis. Risk Assessment (RA)</p> <p>CASE STUDY. Introduction to the case study. Inventory data. Environmental systems analysis (Choice of tools, LCA calculations. MIPS calculations. Ecological footprint calculations. Exergy calculations. Discussion of the case study results</p> <p>DISCUSSION AND CONCLUSION. Natural resource use. Environmental impacts. Natural resource use and environmental impacts. Usability. Integration. Conclusions</p>				
12.	Study methods: lectures, lab, project assignments, individual assignments, self-study.				
13.	Total hours	6 ECTS x 30 = 180 hours			
14.	Hours allocation per activity:	30 + 15 + 40 + 30 + 65 = 180 hours			
15.	Lectures/Lab	15.1.	Lectures (15 weeks x 2)	30 hours	
		15.2.	Lab (student work)	15 hours	
16.	Project Work/Assignments	16.1.	Project assignments	40 hours	
		16.2.	Individual assignments	30 hours	
		16.3.	Self-study	65 hours	
17.	Points/Marks:				
	17.1.	Exams			40

	17.2.	Projects			50	
	17.3.	Attendance			10	
18.	Grading scale		Under 50		5 (five) (F)	
			51 - 60 points		6 (six) (E)	
			61 - 70 points		7 (seven) (D)	
			71 - 80 points		8 (eight) (C)	
			81 - 90 points		9 (nine) (B)	
			91 - 100 points		10 (ten) (A)	
19.	Prerequisites for taking the final exam		Activity 16.1			
20.	Language		English			
21.	Course evaluation		Student questionnaire			
22.	Textbooks					
	22.1	Instruction materials				
		No.	Author	Title	Publisher	Year
		1.	Charles H. Eccleston	Environmental Impact Assessment: A Guide to Best Professional Practices	CRC Press	2011
		2.	John Glasson, Riki Therivel, Andrew Chadwick	Introduction To Environmental Impact Assessment (Natural and Built Environment Series)	Routledge	2012
		3.	Walter Klopffer, Birgit Grahl	Life Cycle Assessment (LCA)	Wiley-VCH	2014
	22.2	Supplemental Instruction Materials				
		No.	Author	Title	Publisher	Year
		1.	Glasson J., Therivel R. and Chadwick A.	Introduction to Environmental Impact Assessment. Principles and procedures, process, practice and prospects.	The Natural and Built Environment Series. T.J. International Ltd, Padstow, UK	1999
		2.	Odum, H.T.	Environmental Accounting - Energy and environmental decision making	John Wiley & Sons, Inc., New York.	1996