

1. GENERAL INFORMATION					
Study programme title	Mining engineering Subprogramme waste treatment and disposal				
Course title	Waste management		Semester	2	
Teacher	Želimir Veinović		Course code	27190	
Course type	<input checked="" type="checkbox"/> obligatory <input type="checkbox"/> elective		ECTS	4,5	
Location					
Language	<input checked="" type="checkbox"/> Croatian <input checked="" type="checkbox"/> English				
Class type	Weekly hours	Teaching staff	Office hours	Room	E-mail
Class	30	Želimir Veinović, PhD, Assistant professor	10,00-12,00	V504	zelimir.veinovic@rgn.hr
Practice	15	Želimir Veinović, PhD, Assistant professor	10,00-12,00	V504	zelimir.veinovic@rgn.hr
Field lecture					
E-learning level	2		Percentage of on-line class (max. 20%)		5%
2. COURSE DESCRIPTION					
Course aims	Introduce students with general concepts on waste materials, their quantification and qualification. Introduce students with basic principles of waste management and separation processes. Explain the differences, advantages and disadvantages of separate collection of waste, thermal and mechanical biological processing methods. Introduce students with the basic principles of recycling, exploitation of by-products of biological treatment and some specific processes of waste treatment. Present basic management methods for other types of waste: dangerous, radioactive, mining.				
Requirements for applicants	Conditions: Bachelor of science of technical sciences (mining, geotechnics, geology, civil engineering, mechanical				

	engineering, etc.) or natural sciences (physics, chemistry, geology, etc.) or in environmental engineering.
Programme level learning outcomes with course contribution	Understanding the principles of modern waste management applicable to all types and types of waste materials. Possibility of analyzing the system or parts of the waste management system, including their environmental impact.
Expected course level learning outcomes (4-10 outcomes)	Ability to implement quantification and qualification of waste materials. Design of a waste management system based on the principle of modern waste management. Choice of technologies applicable to the management of certain types of waste material. Critical assessment of the waste management system.
Course contents by individual lessons	
Class	Practice
L01 – Introduction in environmental engineering and waste management.	P01 – Discussion on concepts and terms.
L02 – Legislative in Croatia and Europe.	P02 – Comparison of legislations.
L03 – 3R principle, “zero waste”, circular economy, Life Cycle assessment.	P03 – Basics of LCA.
L04 – Types and categories of waste.	P04 – Categorisation of examples of waste.
L05 – Separate collection.	P05 – Development of separate collection systems.
L06 – Reduce.	P06 – Examples and ideas on reducing the amounts and hazardous characteristics of waste.
L07 – Reuse.	P07 - Examples and ideas on reusing waste materials.
L08 – Recycle.	P08 - Examples and ideas on recycling waste materials.
L09 – Hazardous waste.	Blitz test. P09 - Examples and ideas on hazardous waste management and reduction.
L10 – Waste in medicine and hospitals.	P10 – Analysis of waste in medicine and hospitals.
L11 – Industrial waste.	P11 - Analysis of industrial waste and its management.
L12 – Electronic and electric waste.	P12 – Analysis of electronic and electric waste management systems.
L13 – Thermal treatment of waste.	P13 – Analysis of thermal treatment of waste – cost, benefit and environmental impact.
L14 – Mechanical-biological processing MBP).	P14. Analysis of MBP – cost, benefit and environmental impact.
L15 – Landfills.	Blitz test.

Defence of seminar thesis				
Students' obligations	Regular presence at the class (maximum absence 3 times), two blitz tests, written (accepted by the teacher) and defended seminar thesis.			
Students' work track <i>(indicate share in ECTS points for each activity so that overall ECTS number corresponds to class credits score):</i>	Class attendance	2	Research	
	Project		Report	
	Colloquium	0,5	Seminar paper	1
	Practical work		Oral exam	1
	Written exam		(Extra)	
Type of exam, grades and evaluation of students work during class and on final exam	Attending classes, active participation in lectures, writing, presenting and defending seminar thesis.			
Mandatory literature (available in the Library and via other media)	Tchobanoglous, G., Kreith, F. (2002): HANDBOOK OF SOLID WASTE MANAGEMENT, McGRAW-HILL, New York.			
Additional literature (at the moment of study program proposition application)	<p>Pichtel, J. (2014): Waste Management Practices: Municipal, Hazardous, and Industrial, Second Edition, CRC Press.</p> <p>Ludwig, C, Hellweg, S., Stucki, S. (2003): Municipal Solid Waste Management: Strategies and Technologies for Sustainable Solutions. Springer, Berlin.</p> <p>Unnisa, S.A., Rav, S.B. (2012): Sustainable Solid Waste Management. CRC Press.</p> <p>Chandra, R. (2015): Environmental Waste Management. CRC Press.</p> <p>Letcher, T., Vallerio. D. (2011): Waste - A Handbook for Management. Academic Press.</p> <p>Pires, A., Martinho, G., Rodrigues, S., Gomes, M.I. (2019): Sustainable Solid Waste Collection and Management. Springer, Berlin.</p>			
Examination terms	Every Thursday within exam-terms (at 10:00).			
Other				