

Faculty of Metallurgy and Technology / ENVIRONMENTAL PROTECTION / CLEANER PRODUCTION

Course:	CLEANER PRODUCTION			
Course ID	Course status	Semester	ECTS credits	Lessons (Lessons+Exercises+Laboratory)
10648	Mandatory	6	7	2+2+0
Programs	ENVIRONMENTAL PROTECTION			
Prerequisites	-			
Aims	Introducing students to modern environmental problems, sustainable development trends, cleaner, ecological technologies and the concept of cleaner production in order to reduce environmental pollution.			
Learning outcomes	At the end of this course, the student will be able to: - define the essential characteristics and general tendencies of sustainable development, -differentiate methods and techniques of prevention of emissions into the environment and new technologies in environmental protection, - explain the principle of the best available technologies (BAT) and BREF documents, - evaluate possible savings in raw materials, water and energy at the beginning of life cycle products, -calculates the material and energy balance on a concrete example, -suggest options for cleaner production in certain industrial processes.			
Lecturer / Teaching assistant	Full professor Ivana Bošković; Associate professor Jelena Šćepanović; MSc Dragan Radonjić			
Methodology	Lectures, exercises, test, seminar paper and final exam. Consultations.			
Plan and program of work				
Preparing week	Preparation and registration of the semester			
I week lectures	Introduction students with lectures, exercises, test and seminar paper, final exam. - Distribution Information and work plan for students.			
I week exercises	Exercises.			
II week lectures	Modern problems of the environment.			
II week exercises	Exercises.			
III week lectures	Important characteristics and general tendencies of sustainable development.			
III week exercises	Exercises.			
IV week lectures	International environmental protection policy in the function of sustainable development.			
IV week exercises	Exercises.			
V week lectures	Environmental impact assessment in cleaner production.			
V week exercises	Exercises.			
VI week lectures	Methods and techniques for the prevention of emissions into the environment: process modification, reuse of raw materials.			
VI week exercises	Exercises.			
VII week lectures	New technologies. BAT principles. BREF documents.			
VII week exercises	Test.			
VIII week lectures	Ecological technologies: zero waste, low waste and recycling technologies.			
VIII week exercises	Correctional test.			
IX week lectures	Assessment of the life cycle product, eco-efficiency.			
IX week exercises	Exercises.			
X week lectures	Indicators and control.			
X week exercises	Exercises.			
XI week lectures	Green business. Raw materials in cleaner technologies			
XI week exercises	Exercises.			
XII week lectures	Concept of cleaner production - material balance.			
XII week exercises	Exercises.			

XIII week lectures	Concept of cleaner production - energy balance.					
XIII week exercises	Exercises.					
XIV week lectures	Examples of applying the concept of "cleaner production" to individual industrial processes.					
XIV week exercises	Seminar paper					
XV week lectures	Examples of applying the concept of "cleaner production" to individual industrial processes.					
XV week exercises	Seminar paper.					
Student workload	Weekly: 7 credits x 40/30 = 9 hours 30 minutes In semester: 7 x 30 = 210 hours					
Per week			Per semester			
7 credits x 40/30=9 hours and 20 minuts 2 sat(a) theoretical classes 0 sat(a) practical classes 2 excercises 5 hour(s) i 20 minuts of independent work, including consultations			Classes and final exam: 9 hour(s) i 20 minuts x 16 =149 hour(s) i 20 minuts Necessary preparation before the beginning of the semester (administration, registration, certification): 9 hour(s) i 20 minuts x 2 =18 hour(s) i 40 minuts Total workload for the subject: 7 x 30=210 hour(s) Additional work for exam preparation in the preparing exam period, including taking the remedial exam from 0 to 30 hours (remaining time from the first two items to the total load for the item) 42 hour(s) i 0 minuts Workload structure: 149 hour(s) i 20 minuts (courses), 18 hour(s) i 40 minuts (preparation), 42 hour(s) i 0 minuts (additional work)			
Student obligations			Students are required to attend classes, complete exercises and defend a seminar paper.			
Consultations			Tuesday: 9-11 a.m. Friday: 9-11 a.m			
Literature			1. Allan Johansson, Clean Technology, CRC, 1992. 2. R.C. Kirkwood, Clean technology and the environment, Springer, 1994. 3. UNIDO, Cleaner Production Programme Manual			
Examination methods			- Activity during the lecture: (0 - 5 points), - Exercise activity: (0-5 points), - Test: (0 - 20 points), - Seminar paper: (0 - 20 points), - Final exam: (0 - 50 points).			
Special remarks			-			
Comment			-			
Grade:	F	E	D	C	B	A
Number of points	less than 50 points	greater than or equal to 50 points and less than 60 points	greater than or equal to 60 points and less than 70 points	greater than or equal to 70 points and less than 80 points	greater than or equal to 80 points and less than 90 points	greater than or equal to 90 points