Basic data of the subject			
University	**University of Applied Sciences in Ferizaj**		
Academic unit	**Faculty of Engineering and Informatics**		
Programme	**Industrial Engineering with Informatics**		
Title of the subject	**Recycling of materials**		
Level of studies	**Bachelor**		
Course status	**Core**		
Year of studies	**III, Semester V**		
Number of hours per week	**3**		
Values of credits - ECTS	**4**		
Time/location			
Course lecturer			
Contact details			
Course description	This course will introduce students to the basics of recycling Municipal Solid Waste such as metalic, ceramic, polymeric, and polymeric composite materials. Mechanical and chemical recycling, decomposition and energy regeneration from waste polymer materials - Incineration. The importance of recycling for preserving the environment.		
Objectives of the subject	The main goals of this subject (course) are: • To gain knowledge about material recycling symbols as well as the role of municipal solid waste recycling process as a current problem in the world • To learn the recycling processes of materials including the steps of recycling step by step. • To assess the importance of municipal solid waste incineration for energy regeneration and environmental protection • To provide students with knowledge about the ecological environment		
Expected learning outcomes	On completion of this subject the student is expected: • To know the symbols of material recycling, and know how to choose the proper method of separation and deposit of Municipal Solid Waste • To understand the methods of recycling different types of Municipal Solid Waste • To describe the most common methods for recycling polymer materials (plastics and polymer composites) in an environmentally friendly way		
Contribution to student workload which should correspond to student learning outcomes			
Activity	**Hours**	**Day/week**	**Overall**

Lectures	3	15	45
Consultations with the teacher	1	15	15
Seminars	1	15	15
Student self study time (in library or at home)	1	15	15
Preparing for the final exam	1	10	10
Total			**100 Hours**
Prerequisites for the realization of the teaching topic	For successful completion of the teaching topic, as well as for the objective assessment of students, it is very important that students have basic knowledge about engineering materials, and in particular about polymer materials. Possession of basic knowledge about these materials is a great priority for students because it allows them to participate actively in class, while for the teacher it is a good opportunity to evaluate the individual activity of students.		
Requirements for the realization of the teaching topic	Hall equipped with white board, computer and projector.		
Ratio between theory and practice	70% Theory (Lectures) 30% Seminar work and participation in practical visits		
Teaching Methodology	In the first hour, students will be introduced to the course Syllabus, which means the content of the course, the basic and additional literature, the students' obligations to the course, as well as the methodology and evaluation criteria of the students. In addition, students will be given a script so that students can use their own study time either in the library or at home to familiarize themselves with the content of the topic of the upcoming lecture. In order to achieve the objectives of teaching and learning, i.e. to acquire basic knowledge of the subject, to develop students' skills and abilities, student-centered teaching is used. The presentation of the teaching topic is done in Powerpoint with active participation of students and immediate individual assessment; while additional clarifications are written in the table. Repetition of the previous topic is preferred as an introduction to the new topic, and is developed primarily through discussion and active student participation. The evaluation of the student's active participation is individual and is done during the lecture when the teacher asks questions. At the end of the lecture, students will be informed briefly about the content of the next lecture. The seminars are directly related to all the topics included in the structure of the lectures of the course, while the selection of the topic is done by the students themselves.		

Assessment and grading	The student is subject to continuous assessment of basic knowledge and assessment of critical thinking skills. Participation of evaluations in determining the final grade: • **Class activity is assessed with 5%:** *Individual assessment.* The student is assessed individually based on his active participation in discussions during lectures. • **The seminar paper is evaluated with 30%** Students have to prepare the Seminar, on the specific topic that deals with environmental issues, present them, as well as submit a physical copy. The seminar will also include a detailed question and answer session. The seminar can be worked individually and in small groups consisting of 2 to 3 students, therefore the evaluation criteria will be in accordance with this. Seminar evaluation criterion (30%): a) Individual evaluation: For the research and technical realization of the work, the student is evaluated with 10%, while for the presentation ability, the student is evaluated with 20%. b) Group evaluation: For the research and technical realization of the group work, each of the students in the group is evaluated with the same points (10%), while for the presentation skills, each student is evaluated individually up to 20%. • **Group work in tasks and case studies is assessed with 15%:** *Group assessment*. Includes case studies or assignments related to the knowledge gained in the taught topics. • ***Rating:*** *91-100 points – graded 10 (ten)* *81-90 points – graded 9 (nine)* *71-80 points – grade 8 (eight)* *61-70 points – grade 7 (seven)* *51-60 points – grade 6 (six)* *0-50 points – The student repeats the exam.*

	Remarks: 1. The delivery of hard copy of the seminar and oral presentation of the seminar must be done only during the semester in which the subject is taught. 2. Recognition of the points gained from the seminar evaluation will be valid until the student takes the exam. 3. Recognition of the points gained from the activity in the classroom, group work in assignments and case studies will also be valid until the student takes the exam. **The final or summative exam is evaluated with 50%:** The final exam evaluates the students' basic knowledge in the taught subject. The exam is individual and is carried out through a written test. The test is designed by the teacher who teaches the subject. The test contains 100 marks consisting of questions of different types such as open-ended questions, multiple-choice questions, combination questions, fill-in questions, etc.
Required or recommended literature resources:	
Required literature	1. Prof. Asoc. Dr. Milihate Aliu, "RICIKLIMI I MATERIALEVE", – Script, 2021, Ferizaj. 2. Prof.Asoc. Dr. Milihate Aliu, "NDOTJA E AMBIENTIT", - Script, Ferizaj, 2020. 3. Mr. Sc. Ismet Malsiu, ligj. i SHL., RIPËRPUNIMI (RICIKLIMI) I MATERIALEVE POLIMERE/ EKOLOGJIA, Script, Ferizaj 2013.
Recommended literature	1. Emmel, Thomas C., "AN INTRODUCTION TO ECOLOGY AND POPULATION BIOLOGY", 1st ed. 1973. 2. Odum, E.P. FUNDAMENTALS OF ECOLOGY, 3rd ed. 1971. 3. Woodard & Curran, Inc., "INDUSTRIAL WASTE TREATMENT" Handbook (Second Edition), 2006. 4. M.sc.Marianthi GURI., REDUKTIM, RIPERDORIM, RICIKLIM - 3R, METODA EKOLOGJIKE TË TRAJTIMIT TË MBETJEVE URBANE, Tiranë, 2008. 5. M. Bittner, W. Michaeli and G. Menges, Hanser "RECYCLING AND RECOVERY OF PLASTICS", edited by J. Brandrup, 1996.

Course details:	
Week	**Lectures**
Week 1:	**Introduction to materials**

Week 2:	**Municipal Solid Waste (MSW)**
***Week 3*:**	**Recycling and waste hierarchy**
Week 4:	**Separation of waste at source**
Week 5:	**Steps of material recycling**
Week 6:	**Material recycling symbols**
***Week 7*:**	**Energy Recovery from Waste - Incineration**
Week 8:	**The impact of waste incineration on the environment and public health**
Week 9:	**Advanced Thermal Treatment - Pyrolysis and Gasification**
Week 10:	**Plastic recycling and recycling symbols**
Week 11:	**Plastic recycling cycle**
***Week 12*:**	**Recycling of glass, paper, steel and metals**
***Week 13*:**	**Recycling and the environmental effects of recycling**
***Week 14*:**	**Presentation of seminar topics by students** The student(s) will be required to prepare and deliver a Seminar, on the assigned topic with the help of Power Point Presentation as well as submit a type written report. The seminar shall also include a detailed question answer session.
***Week 15*:**	**Visit to the factory: Students will visit nearby industries and collect information about recycling process.** (Example of plastic recycling process of recovering waste or scrap plastic and reprocessing it into useful product). **Or,** **Preparing students for the final exam**
Academic policies and rules of conduct:	
Etiquette policies are set in accordance with the UASF statute • First of all, the student should be mindful and respectful towards the institution and the academic rules • They should respect the schedule of lectures, exercises, practical work and be attentive to the class. • It is mandatory to have and show the ID on the exam and during the factory visits • When preparing seminar papers, the student must follow the instructions given by the teacher for the research and technical execution of the paper.	