



UNDERGRADUATE STUDY: **TRANSPORT**

SEMESTER (II)

Syllabus

Academic year 2023/2024

Course:		Railway Traffic Technology			
Head of course: Prof. Tomislav Josip Mlinarić , Ph.D.					
Co-lecturers: Asst. Prof. Marjana Petrović , Ph.D. Matea Mikulčić , MSc Traff. Eng.					
Semester: II	Course code: 36076	Lectures: 30	Auditory exercises: 30	Seminars:	ECTS credits: 6
Group for lectures: 20 students			Group for auditory exercises and seminars: 20 students		

Objective of the course:

- To master the concepts of technology of railway stations in order to understand the role of railway stations and stops in network
- Adopt and understand theory of shunting in order to deal with the problems of available infrastructure capacities
- Adopt and understand the methodology of developing technological process of railway stations

Learning outcomes:

After the completion of the course the students will be able to:

1. define the basic terms and describe technological processes in railway stations
2. calculated the need for track capacities, shunters and personnel
3. plan railway station technology process for given timetable
4. connect the work of railway stations with timetable
5. analyze coordination between stations available capacities and work in number of trains (wagons)
6. estimate robustness of technological work process for railway station
7. evaluate proposed solutions based on qualitative and quantitate indicators





LECTURES, EXERCISES and SEMINARS

Week	Syllabus	Form of classes	Performed by	Lessons	Remark
1.	<ul style="list-style-type: none">Introduction to the course content, literature and credit system	L	Tomislav Josip Mlinarić	2	
	<ul style="list-style-type: none">Definition of basic terms related to technological processes in railway transport	AE	Matea Mikulčić	2	
2.	<ul style="list-style-type: none">General terms related to railway operations in stations	L	Tomislav Josip Mlinarić	2	
	<ul style="list-style-type: none">Stub tracks based shunting operations	AE	Marjana Petrović	2	
3.	<ul style="list-style-type: none">Basic principles of railway operations in stations	L	Tomislav Josip Mlinarić	2	
	<ul style="list-style-type: none">Timing of shunting movements in case of stub tracks based shunting operations	AE	Matea Mikulčić	2	
4.	<ul style="list-style-type: none">Theoretical approach to shunting operations - basic principles of shunting operations, technical resources and organization of shunting operations	L	Tomislav Josip Mlinarić	2	
	<ul style="list-style-type: none">Timing of shunting movements in case of stub tracks based shunting operations (disassembling of train)	AE	Matea Mikulčić	2	
5.	<ul style="list-style-type: none">Train shunting technology - stub tracks and hump based shunting operations	L	Tomislav Josip Mlinarić	2	





	<ul style="list-style-type: none"> Timing of shunting movements in case of stub tracks based shunting operations (composition of train) 	AE	Marjana Petrović	2	
6.	<ul style="list-style-type: none"> Shunting of freight train units in a railway station 	L	Tomislav Josip Mlinarić	2	
	<ul style="list-style-type: none"> Hump yards - shunting capacity calculation 	AE	Marjana Petrović	2	
7.	<ul style="list-style-type: none"> Shunting of freight train units in a hump yard 	L	Tomislav Josip Mlinarić	2	
	<ul style="list-style-type: none"> Shunting of freight train units in a hump yard 	AE	Marjana Petrović	2	
8.	<ul style="list-style-type: none"> Technological processes in railway stations 	L	Tomislav Josip Mlinarić	2	
	<ul style="list-style-type: none"> Station track capacity calculation 	E	Marjana Petrović	2	
9.	<ul style="list-style-type: none"> Train sorting process 	L	Tomislav Josip Mlinarić	2	
	<ul style="list-style-type: none"> 1st colloquium exam Discussion and answer the colloquium questions 	E	Matea Mikulić	2	
10.	<ul style="list-style-type: none"> Technological process of rail cars accumulation 	L	Tomislav Josip Mlinarić	2	
	<ul style="list-style-type: none"> Marshalling yards and track capacity assessment 	E	Marjana Petrović	2	



11.	<ul style="list-style-type: none"> Mechanization and automation of railway station processes 	L	Tomislav Josip Mlinarić	2	
	<ul style="list-style-type: none"> Calculation of the required number utilization and productivity of shunters 	E	Matea Mikulčić	2	
12.	<ul style="list-style-type: none"> Timing of technological process 	L	Tomislav Josip Mlinarić	2	
	<ul style="list-style-type: none"> Calculation of the required number of shunting workers 	E	Matea Mikulčić	2	
13.	<ul style="list-style-type: none"> Shunting of passenger train units in a railway station 	L	Tomislav Josip Mlinarić	2	
	<ul style="list-style-type: none"> 2nd colloquium exam Discussion and answer the colloquium questions 	E	Matea Mikulčić	2	
14.	<ul style="list-style-type: none"> Efficiency indicators and analysis of technological processes 	L	Tomislav Josip Mlinarić	2	
	<ul style="list-style-type: none"> Application of Expert Choice computer application for technological processes of train shunting operations 	E	Marjana Petrović	2	
15.	<ul style="list-style-type: none"> Efficiency indicators and analysis of technological processes 	L	Tomislav Josip Mlinarić	2	
	<ul style="list-style-type: none"> Application of Expert Choice computer application for technological processes of train shunting operations 	E	Marjana Petrović	2	

L = Lectures; AE = Auditory Exercises; LE = Laboratory Exercises; S = Seminars





STUDENT OBLIGATIONS AND EXAMS

Conditions for obtaining signatures:

Attendance is mandatory and students are required to attend at least 50% of the classes and make Seminar.

Written exam:

There are two ways of passing the exam:

- a) **Student can attend two short written exams**, the 1st one in the middle of the semester and the 2nd one at the end. At each exam is possible to gain 10 points. Only those students that achieve minimum of 5 points on 1st exam can attend 2nd exam. In order to pass the written exam it is necessary to achieve minimum of 5 points on each short exam. Correlation between number of points and mark is shown in the table on the end of this document.
- b) **Student can attend one written exam after the end of the semester** on which is possible to gain 10 points. All students who met necessary conditions for obtaining signatures can attend this exam.

Oral exam: In order to attend oral exam student must pass written exam.

LITERATURE

a) Obligatory literature:

1. J. Pachl: Railway Operation and Control 2nd edition, VTD Rail Publishing, Mountlake Terrace (USA), 2009.
2. I.A. Hansen, J. Pahl: Railway Timetable & Traffic – Analysis – Modelling - Simulation, EURAIL PRESS 2008.

b) Recommended literature:

1. Presentations from classes





METHODOLOGY OF THE IMPLEMENTATION OF THE COURSE PLAN

1. LECTURES

In the course of the lectures the theoretical framework of the curriculum is presented and followed by practical examples. To this end Power Point presentations are used.

2. AUDITORIAL EXERCISES

In the course of exercises students are required to practice diverse calculations solving challenges in order to define all necessary parameters for a railway transport system.





3. DOCUMENTATION

Attendance list is signed by students prior to every lecture.

5. SCORING SYSTEM

Table 1 The scoring system for the monitoring of students and explained credit values in ECTS credits

Activity		ECTS credits
Class attendance		2
Seminar		-
1. Short exam	Written exam	2
2. Short exam		
Oral exam		2
In total:		6

METHODS OF MONITORING QUALITY THAT ENSURE ACQUISITION OF EXIT COMPETENCES

The student's attendance record is kept during the semester. At the end of the semester an evaluation of the quality and efficiency of the course and the lecturers will be carried out. Information on the achievement of learning outcomes and student progress will be used by teachers for self-evaluation and improvement of teaching methods.

