



GRADUATE STUDY: **TRANSPORT**

SEMESTER (VI)

Syllabus

Academic year 2023/2024

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|---|------------------------------|-------------------------------|---|---------------------|---------------------------|
| Course: | | Railway Infrastructure | | | |
| Head of course: Asst. Prof. Martin Starčević , Ph.D. | | | | | |
| Co-lecturers: | | | | | |
| Semester: VI | Course code: 62819 | Lectures: 30 | Auditory exercises: 10 | Seminars: 20 | ECTS credits: 5 |
| Group for lectures: 5 - 8 students | | | Group for auditory and laboratory exercises: 5 - 8 Students | | |

Objective of the course:

- Introduce to the students all the subsystems of railway infrastructure
- Acquiring knowledge about the role of infrastructure elements for safely conducting of railway traffic
- Adoption of the necessary knowledge and skills for the design of a project solution of the railway line

Learning outcomes:

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

1. Define the elemental parts of the railway track
2. Identify integral elements of the railway upper track structure
3. Calculate all the relevant geometric elements of the railway track layout
4. Design the simple railway track layout using AutoCAD application



LECTURES and SEMINARS

| Week | Syllabus | Form of classes | Performed by | Lessons | Remark |
|------|--|-----------------|------------------|---------|--------|
| 1. | <ul style="list-style-type: none">Introduction with syllabus, literature and scoring system.Introduction of railway infrastructure | L | Martin Starčević | 2 | |
| | <ul style="list-style-type: none">Railway track, definition and integral elements | L | Martin Starčević | 2 | |
| 2. | <ul style="list-style-type: none">Upper structure elements - rail:<ul style="list-style-type: none">type of railsrail markings | L | Martin Starčević | 2 | |
| | <ul style="list-style-type: none">Upper structure elements – sleepers<ul style="list-style-type: none">the role of sleeperstypes of sleepers | L | Martin Starčević | 2 | |
| 3. | <ul style="list-style-type: none">Upper structure elements – rail joints<ul style="list-style-type: none">type of rail jointsrequirements of rail joints | L | Martin Starčević | 2 | |
| | <ul style="list-style-type: none">Upper structure elements – fastenings<ul style="list-style-type: none">the role of fasteningstypes of fastenings | L | Martin Starčević | 2 | |
| 4. | <ul style="list-style-type: none">Upper structure elements – ballasted track<ul style="list-style-type: none">constructionadvantages and disadvantages | L | Martin Starčević | 2 | |
| | <ul style="list-style-type: none">Upper structure elements –slab track<ul style="list-style-type: none">constructionadvantages and disadvantages | L | Martin Starčević | 2 | |
| 5. | <ul style="list-style-type: none">Upper structure elements –switches and crossings<ul style="list-style-type: none">design of switches and crossingstypes of switches and crossings | L | Martin Starčević | 2 | |



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|-----|---|---|------------------|---|--|
| | <ul style="list-style-type: none">▪ Loading gauges▪ Railway tracks cross-section | L | Martin Starčević | 2 | |
| 6. | <ul style="list-style-type: none">▪ Track geometry<ul style="list-style-type: none">○ curvature and superelevation in horizontal curves | L | Martin Starčević | 2 | |
| | <ul style="list-style-type: none">▪ Track geometry<ul style="list-style-type: none">○ transition curves | L | Martin Starčević | 2 | |
| 7. | <ul style="list-style-type: none">▪ Track geometry<ul style="list-style-type: none">○ cross level transition○ gradients○ vertical transition curves | L | Martin Starčević | 2 | |
| | <ul style="list-style-type: none">▪ Railway crossings<ul style="list-style-type: none">○ types of LC's○ visibility triangle | L | Martin Starčević | 2 | |
| 8. | <ul style="list-style-type: none">▪ Short exam | L | Martin Starčević | 2 | |
| 9. | <ul style="list-style-type: none">▪ Introduction to the project assignment<ul style="list-style-type: none">○ Fundamentals of Autodesk AutoCAD application | S | Martin Starčević | 3 | |
| 10. | <ul style="list-style-type: none">▪ Determining the best position for railway line on topographic map | S | Martin Starčević | 2 | |
| 11. | <ul style="list-style-type: none">▪ Calculation and drawing of tangential lines | S | Martin Starčević | 2 | |
| 12. | <ul style="list-style-type: none">▪ Calculation and drawing of transitional horizontal curves | S | Martin Starčević | 2 | |



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|-----|----------------------------------|---|------------------|---|--|
| 13. | ▪ Determination of route mileage | S | Martin Starčević | 2 | |
| 14. | ▪ Preparation for plotting | S | Martin Starčević | 2 | |
| 15. | ▪ Short exam | S | Martin Starčević | 2 | |

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





STUDENT OBLIGATIONS AND EXAMS

Conditions for obtaining signatures:

Successful completion of a seminar containing railway track layout at least 70% attendance on lectures and seminars

LITERATURE

a) Obligatory literature:

Esveld, C.: *“Modern Railway Track”*; second edition, Delft University of Technology, Zaltbommel, The Netherlands, 2001.

b) Recommended literature:

Mundry, J.S.: *“Railway Track Engineering”*; McGraw Hill Education, Chennai, India, 2017.





METHODOLOGY OF THE IMPLEMENTATION OF THE COURSE PLAN

1. LECTURES

Lectures are following the material in obligated and recommended literature using *PowerPoint* presentation

2. SEMINARS

Students will learn the fundamentals of Autodesk AutoCAD software and its application in designing the railway track layout

3. DOCUMENTATION

Electronic records of presence in lectures and seminars

4. SCORING SYSTEM

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

| no | Segment: | ECTS credits |
|----------|----------------------------|--------------|
| 1. | Presence in lectures | 2 |
| 2. | Seminar paper | 2 |
| 3. | Written and verbal exam | 1 |
| Σ | Overall ECTS points | 5 |

Information for students (scoring system, implementation plan, learning outcomes, syllabus, literature, consulting teachers, the announcement of results of examinations or colloquium, and all other information):

- The final evaluation is based on attendance, compulsory seminar paper, written exam and verbal parts of the exam

5. CURRICULUM VITAE





Martin Starčević was born on December 9th 1979, in Zagreb. In 1998 he enrolled at the Faculty of Transport and Traffic Sciences, where he earned the academic title Bachelor of Engineering in 2005. Since 2007, he is an employee of the Faculty of Transport and Traffic Sciences where he defended his doctoral dissertation in 2015 titled: Level Crossings Risk Assessment Model. Since July 2018, he is an assistant professor.

