

I. Subject Specification

1. Basic Data

1.1 Title

Railway Tracks

1.2 Code

BMEEOUVAT41

1.3 Type

Module with associated contact hours

1.4 Contact hours

Type	Hours/week / (days)
Lecture	3

1.5 Evaluation

Exam

1.6 Credits

3

1.7 Coordinator

name	Dr. Nándor Liegner
academic rank	Associate professor
email	liegner.nandor@emk.bme.hu

1.8 Department

Department of Highway and Railway Engineering

1.9 Website

<https://epito.bme.hu/BMEEOUVAT41>

<https://edu.epito.bme.hu/course/view.php?id=457>

1.10 Language of instruction

hungarian and english

1.11 Curriculum requirements

Compulsory in the Civil Engineering (BSc) programme

1.12 Prerequisites

Strong prerequisites:

- Surveying I. (BMEEOAFAT41)

1.13 Effective date

5 February 2020

2. Objectives and learning outcomes

2.1 Objectives

The objective of the subject is that the students get familiarized with basic concepts of railway tracks, types, requirements and major technical parameters of its structural elements, geometry of the tracks, most important design criteria, types of turnouts and crossings, and the with the basic concepts of railway stations.

2.2 Learning outcomes

Upon successful completion of this subject, the student:

A. Knowledge

1. will learn the most important basic characteristics of railway transportation (passenger only, mixed, freight only, conventional, high-speed, urban, etc.)
2. will learn the history and development of the railway transportation, and current development strategies,
3. will learn the basic concepts of the railway tracks and vehicles, such as clearances, gauge, etc.)
4. will learn principals of movement characteristics, speed, acceleration, changing of acceleration,
5. will learn principals of geometrical design of the railway tracks, curves, transition curves, super-elevations, superelevation transition,
6. will learn calculation of surveying of railway lines, staking of major points and details of curves and transition curves,
7. will learn the most important criteria of horizontal and vertical design parameters of the railway tracks,
8. will learn the types, materials and requirements of structural elements, such as rails, sleepers, rail fastenings, ballast, rail joints, welding of rails, structural elements of highway crossings,
9. will learn the types of turnouts, crossings, double slips, their geometrical parameters and structural elements, (radius, deflection, angle of deflection, velocity, etc.)
10. will learn calculation and geometry of simple track connections,
11. will learn the types and basic concepts of railway stations, track types, stations, passenger platforms, facilities for loading of freight, marshalling yards, etc.
12. will learn categories of urban railway railways, such as networks, track geometry, types of structural elements
13. will learn principals of horizontal layout, vertical sections and cross-sections of railway lines

B. Skills

1. will be able to distinguish and recognize different categories of railway transportation, to select appropriate category of railway lines,
2. will be able to understand principal geometrical designs of tracks in horizontal and vertical aspects,
3. will be able to understand movement characteristics, and geometrical elements of railway lines,
4. will be able to identify and select the most important structural elements of the railway tracks for applications,
5. will be able to understand surveying of railway lines, staking of cardinal and detail points of circular curves and transition curves,
6. will be able to perform a simple design task.

C. Attitudes

1. cooperates with the teachers, lecturers,
2. continuously extends his/her knowledge,
3. is open to get familiarized with the application of modern technical solutions,
4. is intent on precise and error-free problem solving.

D. Autonomy and Responsibility

1. is able to autonomously solve basic problems in the field of railway design and construction,
2. applies a system-based approach in solving problems.

2.3 Methods

Lectures, exercises, written and oral communications, homework and assignments solved individually.

2.4 Course outline

Week	Topics of lectures and/or exercise classes
1.	Most important basic characteristics of railway transportation (passenger only, mixed, freight only, conventional, high-speed, urban, etc.)
2.	Basic concepts of the railway tracks and vehicles, such as clearances, gauge, wheel profiles, superstructure, substructures, cross-sections, etc.)
3.	principals of movement characteristics, speed, acceleration, changing of acceleration,
4.	geometrical design of the railway tracks, curves, transition curves, superelevations, superelevation transition,
5.	surveying of railway lines, staking of major points and details of curves and transition curves,
6.	types, materials and requirements of structural elements of the railway track, rails, sleepers,
7.	types, materials and requirements of structural elements, rail fastenings
8.	types, materials and requirements of structural elements, ballast, rail joints, welding of rails, structural elements of highway crossings,
9.	types of turnouts, crossings, double slips, their geometrical parameters and structural elements, (radius, deflection, angle of deflection, velocity, etc.)
10.	calculation and geometry of simple track connections
11.	most important criteria of horizontal and vertical design parameters of the railway tracks 1st part,

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12.	most important criteria of horizontal and vertical design parameters of the railway tracks 2nd part,
13.	cross-sections of the tracks
14.	continuously welded rail tracks.

The above programme is tentative and subject to changes due to calendar variations and other reasons specific to the actual semester. Consult the effective detailed course schedule of the course on the subject website.

2.5 Study materials

a) Online materials:

1. Dr. Nándor Liegner: Railway Tracks, lecture notes, Budapest, 2014.
2. Veronika Sárik: Railway Tracks BSc, Project guide, 2014.

2.6 Other information

2.7 Consultation

The instructors are available for consultation during their office hours, as advertised on the department website.

This Subject Datasheet is valid for:

2023/2024 semester II

II. Subject requirements

Assessment and evaluation of the learning outcomes

3.1 General rules

The assessment of the learning outcomes specified in clause 2.2. above and the evaluation of student performance occurs via 1 homework and 1 exam.

3.2 Assessment methods

Evaluation form	Abbreviation	Assessed learning outcomes
homework	HF1	A.2-A.13; B.2-B.6; C.1-C.4; D.1-D.2
exam	V	A.1-A.13; B.1-B.6; C.1-C.4; D.1-D.2

The dates of deadlines of assignments/homework can be found in the detailed course schedule on the subject's website.

3.3 Evaluation system

Abbreviation	Score
HF1	50%
V	50%
Total achievable during the semester	100%
Sum	100%

Criteria for completion of the subject are to submit the homework and get a grade of at least pass, and to get a grade of at least pass at the exam.

3.4 Requirements and validity of signature

To be present at least 70% of the classes, submit the homework and receive a grade of at least pass of it.

3.5 Grading system

If the student satisfies the attendance criteria, his/her mark will be determined as follows.

The final marks are calculated as the average of the grades received for the homework and for the exam.

3.6 Retake and repeat

1. The repetition of the homework is not possible.
2. Repetition of the exam is allowed.

3.7 Estimated workload

Activity	Hours/semester
contact hours	14×3=42
preparation of homework	3×8=24
home studying of the written material	1×24=24
Sum	90

3.8 Effective date

5 February 2020

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