Course Name: Track Maintenance

Course Code	Course Status	Semester	ECTS Credits	Number of classes
	Compulsory	III	5	2P+1V+1L

Study programmes: Master academic studies - study programme Civil Engineering;
4 semesters and 120 ECTS credits.

Conditioned by other courses: /

Aims of the course: Getting basic knowledge in Track Maintenance

Learning outcomes: After passing this exam, student will be able to: 1. Knowledge about rail track maintenance system, 2.Knowledge about rail track condition control, 3. Knowledge about rail track superstructure maintenance, 4. Knowledge about rail track substructure maintenance, 5. Knowledge about turnout maintenance, 6. Knowledge about control and reconstruction of railway facilities, 7.Knowledge about high speed rail ways maintenance.

Teacher and assistant: Assoc.Prof. Zlatko Zafirovski, Dr-Ing. - teacher
Katarina Mirkovic, PhD - assistant

Methods of teaching and learning: Lectures, exercises, laboratory exercise, consultations, semester project.

Course content:

I teaching week	Basic concepts on track maintenance
II teaching week	Track condition inspection: track geometry, rails
III teaching week	Track condition inspection
IV teaching week	Track maintenance work types: track maintenance, track reconstruction
V teaching week	Permanent way maintenance: manual maintenance and maintenance
VI teaching week	Track material regeneration: rails, turnouts, fastenings, sleepers, ballast
VII teaching week	PRE-EXAM I
VIII teaching week	Turnout maintenance: point blades, frogs, wing and guardrails
IX teaching week	Track substructure maintenance: track formation level, sub-base, drainage ditches
X teaching week	Railway facility inspection: inspection of bridges, culverts,
XI teaching week	Railway facility inspection: inspection of tunnels, level crossings
XII teaching week	Maintenance and reconstruction of railway facilities
XIII teaching week	Track maintenance for high speed railways
XIV teaching week	PRE-EXAM II
XV teaching week	Summary and preparation for the final exam.

Student's obligations: Attending of lectures and exercises, elaboration of semester project, passing of pre-exams.

STUDENTS LOAD

Per week	In semester
5 credits x 40/30 = 6.67 hours Structure: 2 hours lectures 2 hours exercises 2.67 hours individual work, including consultations	Teaching and final exam: (6.67 hours) x 16 = 106.67 hours Necessary preparations before semester (administration, enrolment etc) 2 x (6.67 hours) = 13.33 hours Total load for the course: 5x30 =150 hours Additional work for exam preparation in the additional exam session, including passing of correctional exam between 0 and 30 hours (remaining time from the previous issues to the final load for the course of 150 hours) Load structure: 106.67 hours (teaching) + 13.33 hours (preparation) + 30 hours (additional work)

Literature: Basic literature:

1. Zdenka Popović, *Osnove projektovanja železničkih pruga*
2. C.Esveld, Modern Railway Track, SecondEdition, MRT Productions, Zaltbommel, 2001,
3. Mikulić, J., Stipetić, A.,Željezničke pružne građevine, Institut građevinarstva hrvatske, Zagreb, 1999
4. Pravilnik o održavanju gornjeg stroja željezničkih pruga (Regulations on maintance of track railroads), (Pravilnik 314);
5. Pravilnik o održavanju donjeg stroja željezničkih pruga (Regulations on subrstructure railroads) (Pravilnik 315)

Examining system and grading:
Examining is continuous during the semester and in the final exam.
Maximum number of points in semester: 100. Maximum number of points at final exam: 50.
The structure of examination and points is as follows:

- semester project: 15 do 30 (min positively marked part of semester project = 4.5 points);
- pre-exams: 2 x (10 do 20) = 20 do 40 (min positively marked pre-exam = 15 points);
- final exam: do 50 (min positively marked final exam = 25 points).

Pre-exams and final exam are in written form.
Positive grade is obtained for min 51 points.

Special notes for the course:

Data prepared by teacher: Assoc.Prof Zlatko Zafirovski, Dr-Ing.

Note: Additional information on course may be obtained from course teacher, assistant, head of the study programme and vice-dean for teaching.