

**School of Engineering, Department of Civil Engineering**

**GEO-E3040 Geometric Design of Roads (5cr) Responsible Teacher:** Professor of Practice Nina Raitanen (nina.k.raitanen@aalto.fi )

**Lectures**

Mondays 10:15-12:00 R266 and Wednesdays 12:15-14:00 R266

First lecture Mon 9.1.2023 10:15 R266

Lecturers: Several lectures from consultancy companies

**Exercises**

Thursdays 12.30-16.00 A046 a

Teachers: Anni Heilala (Arkance), Oskar Eklöf (HAMK) and Artturi Kuronen (Ramboll)

**First exercise Thursday 12.1.2023 12.30-16.00 A046a**

**Course mode:** The entire course is offered in-person (face to face F2F).

Lectures are held in F2F mode. Recording will be posted on MyCourses is possible.

Exercise will also be offered F2F. Similarly to lectures the recording will be posted on MyCourses, if possible.

GEO-E3040 Geometric Design of Roads poses several challenges to students and instructors in being offered online due to the content of the class and the use of specific software. **We strongly recommend attending in person, especially the exercise sessions on Thursdays.**

**Assessment Methods and Criteria**

In-class activities, computer exercises, and homework. **There is NO EXAM.**

Calculation, planning, and design exercises (75%); lecture quizzes, or other tests (25%)

## **Content**

- Development and applications of concepts of geometric design
- Design controls and criteria
- Design elements and their use (sight distance, horizontal and vertical alignment, cross-section elements, highway types, intersection design elements, types of interchanges and interchange design elements, grade separations, and clearance)
- Road location in a landscape (engineering, economic and social aspects, ecology, aesthetics)
- Design of streets and bicycle routes
- Drainage and road environment
- Intersections and cross-sections
- Road planning process (plans, specifications, and controls)
- Planning as a part of a life cycle of a road and CO<sub>2</sub> emissions
- Information management and BIM methods applied to geometric design (in exercises)
- Design of tram lines

## **Learning Outcomes**

After this course, the students can apply and evaluate different geometric design elements and understands their mathematical basis. Students can analyze how road geometry affects roadside safety and how road alignment interacts with the surrounding landscape and urban space. Students can identify the role of the planning phase of a road as a part of the life cycle of a road and its impact on environmental issues.

Registration through Sisu.

**Participation in exercises is mandatory (80%). Also, attendance in lectures is needed to pass the course!**

**Max 30 students. Primarily for students from Master's Programme in Geonegineering or MSc Programme in Spatial Planning and Transportation Engineering.**

**GEO-E3040 Geometric Design of Roads (5cr)**
**Preliminary Timetable 2023 (changes are possible)**

Week	Lecture Mon 10.15-12.00 R266	Lecture Wed 12:15-14:00 R266	Calculation/Design exercise Thu 12.30-16.00 A046a
2 (9.1.-13.1.)	Course introduction: Vehicle types and dynamics, planning and design process (NR)	Driver/user psychology, (MM)	<b>12:30-16:00</b> Ex.1 AutoCAD repetition. (OE)
3 (16.1.-20.1.)	Design elements, horizontal and vertical. Road typology (NR)	Bicycle infrastructures (TP)	<b>12:30-16:00</b> Ex 2. Introduction to Novapoint. (AH)
4 (23.1.-27.1.)	Street design and drainage in street areas, (KR)	Design of cross-section (HAM)	<b>12:30-16:00</b> Ex. 3. Geometry design tools. Vertical and horizontal geometry. <b>Delivery of Design exercise.</b> (OE+AK)
5 (30.1.-3.2.)	Intersections (HAM)	Drainage and road environment (OE)	<b>12:30-16:00</b> Ex. 4. Road model and cross-sections. Cont. design exercise. (OE+AK)
6 (6.2.-10.2.)	<u>Terminal and industrial areas (KK)</u>	Data management and other IT issues (JS)	<b>12:30-16:00</b> Ex. 5. Road model and intersections. Cont. design exercise. (OE+AK)
7 (13.2.-17.2.)	Design of tramways (AW)	Planning and life-cycle, CO2 emissions (LKT)	<b>12:30-16:00</b> Ex. 6. Drainage, Water&Sewer. Cont. design exercise. (AK)
8 (20.2.-24.2.) (Evaluation week)			<b>12:30-16:00</b> Ex. 7. Producing final reports: drawings, mass calculations, and 3D models. Cont. design exercise. (OE+AK)

**Teachers:**

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