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 8.1.2024 10:15 R266

Lecturers: Nina Raitanen & several lectures from consultancy companies

Exercises

Thursdays 12.30-16.00 A046 a

Teachers: Terhi Immonen (Arkance), Ville Autio (Ramboll) and Artturi Kuronen (Ramboll)

First exercise Thursday 11.1.2024 12.30-16.00 A046a

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

Lectures and exercises are held in F2F mode.

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_2 emissions
- Information management and BIM methods applied to geometric design
- 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.

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Preliminary Timetable 2024 (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 (8.1.-12.1.)	**Course introduction: Design elements, horizontal and vertical.(NR)**	**Design controls and criteria (NR)**	**12:30-16:00** Ex.1 AutoCAD repetition. (AK +VA)
3 (15.1.-19.1.)	**Driver/user psychology, (MM)**	**Design of cross-section (HAM)**	**12:30-16:00** Ex 2. Introduction to Novapoint. (TI)
4 (22.1.-26.1.)	**Design Intersections (HAM)**		**12:30-16:00** Ex. 3. Geometry design tools. Vertical and horizontal geometry. **Delivery of Design exercise.** (AK+VA)
5 (29.1.-2.2.)	**Design of tramways (AW)**	**Bicycle infrastructures (TP)**	**12:30-16:00** Ex. 4. Road model and cross-sections. Cont. design exercise. (AK+VA)
6 (5.2.-9.2.)	**Street design and drainage in street areas, (KR)**	**Data management and other IT issues (NN)**	**12:30-16:00** Ex. 5. Road model and intersections. Cont. design exercise. (AK+VA)
7 (12.2.-16.2.)	**Planning and life-cycle, CO2 emissions (LKT)**	**Design process and safety (NR)**	**12:30-16:00** Ex. 6. Drainage, Water&Sewer. Cont. design exercise. (AK+VA)
8 (19.2.-23.2.) (Evaluation week)			**12:30-16:00** Ex. 7. Producing final reports: drawings, mass calculations, and 3D models. Cont. design exercise. (AK+VA)

Teachers:
Lectures
NR	Nina Raitanen	nina.k.raitanen@aalto.fi
MM	Miloš Mladenović	milos.mladenovic@aalto.fi
LKT	Leena Korkiala-Tanttu	leena.korkiala-tanttu@aalto.fi
TP	Teppo Pasanen, Hki	teppo.pasanen@hel.fi
KR	Kersti Reittu, Ramboll	kersti.reittu@ramboll.fi
HAB	Hamilkar Alava Bergroth, AINS Group	Hamilkar.bergroth@ains.fi
NN	, Sitowise	
AW	Abul Wafa Arif Reza, WSP	abul.reza@wsp.com

Exercises
AH	Terhi Immonen, Arkance	terhi.immonen@arkance-systems.com
AK	Artturi Kuronen, Ramboll	artturi.kuronen@ramboll.fi
VA	Ville Autio, Ramboll	ville.autio@ramboll.fi