Name of subject	INTRODUCTION TO ROAD ENGINEERING (8 ECTS)
Subject/module code	**YMK11208**
Science taught semester (s).	1st and 2nd semesters
Module leader	Professor Inomjon G‘aniyev, Candidate of Technical Sciences, Head of the Department of Road Engineering
Education language	Uzbek
Connection to the curriculum	Compulsory
Training hours (this including independent education)	**Total hours – 240 hours** **Contact hours – 96 hours** Lecture training hours – 48 hours Practical training hours – 48 hours **Independent study – 144 hours**
Course work	No
ECTS	8
The purpose and tasks of subject / learning outcomes	**The purpose of teaching the subject is** to introduce the road engineering profession and the place of roads in transport infrastructure. Students follow a road through planning, investigation, design, construction, operation, maintenance, repair and reconstruction. They examine how engineering decisions affect safety, the economy, communities and the environment, building a foundation for later professional studies. **The objectives of teaching the subject** are to introduce road engineering practice, the assets engineers work with and the responsibilities of road organisations. Explain road classification, road elements, earthworks, pavements, drainage and highway structures. Show how route investigation, surveying, geology and traffic data inform design and construction. Introduce road asset management, diagnostics, operation, repair and life-cycle costs. Develop an understanding of traffic safety, inclusion, climate resilience, decarbonisation and engineering ethics. Introduce GIS, BIM, digital road passports, sensors, drones and data-informed decisions. Develop skills in field observation, teamwork, technical sketching, presentations and engineering report writing. **Learning outcomes:** 1. Explain the work of a road engineer, the profession’s role in society and the economy, and the career paths it offers. 2. Classify roads by administrative importance, function and technical characteristics. 3. Use diagrams to identify the road alignment, longitudinal profile, cross-section, road earthworks, pavement and drainage elements. 4. Explain how route investigations, design, construction and operation relate to one another. 5. Identify road construction materials and basic construction methods by their intended use. 6. Explain the Safe System approach to road safety and the roles of human factors and the road environment. 7. Visually inspect a road section, record signs of its condition and prepare a photographic report. 8. Explain the road life cycle, road asset management and preventive maintenance. 9. Apply criteria for sustainability, climate risk, resource efficiency and engineering ethics when making a decision. 10. Prepare a basic digital record of a road asset using an open map or a geographic information system (GIS).

	11. Find technical information from a reliable source, cite that source and distinguish inaccurate information. 12. Work in a small team to develop and defend an evidence-based preliminary solution to a road engineering problem.
Course content (topics)	**I. Main Theoretical Part (Lecture Sessions).** Topics: 1. The road engineering profession and transport infrastructure. 2. The transport system and the role of roads. 3. Institutions and law in Uzbekistan's road sector. 4. Road classification and technical categories. 5. Road alignment in plan. 6. Longitudinal profile and cross-section. 7. Introduction to route investigations. 8. Road earthworks and soils. 9. Pavement systems. 10. Road construction materials. 11. Road drainage systems. 12. Highway structures and roadside equipment. 13. The road construction process. 14. Construction plant and site logistics. 15. Principles of traffic flow. 16. Road safety and human factors. 17. Road operation and maintenance. 18. Road condition and diagnostics. 19. Repair, reconstruction and asset management. 20. The road life cycle and economic appraisal. 21. Ecology and sustainable roads. 22. Climate-resilient road infrastructure. 23. Digital road engineering. 24. The future of road engineering and the integrated project. **II. Instructions and recommendations for organizing laboratory exercises** Laboratory work is not included in the curriculum **III. Practical training instructions and recommendations** The instructor's preparation for a practical session begins with the study of initial documents (such as the curriculum, topic schedule, etc.) and concludes with the development of a detailed lesson plan. The instructor must have a clear understanding of the objectives and tasks of the practical session, as well as the amount of work each student is expected to perform. Methodological guidelines serve as the primary instructional document for instructors in preparing and conducting practical sessions. The purpose of the practical session is to facilitate the comprehension of theoretical material, the acquisition of practical skills, the ability to consciously apply knowledge in academic and professional activities, and the development of critical thinking and confidence in forming personal viewpoints. *Recommended Practical Topics:* 1. Map career paths in road design, route investigation, construction, operations and research. 2. Analyse the transport and social functions of a local road section. 3. Use official sources to identify the applicable law and the authorities responsible for roads. 4. Use examples to distinguish between a road's classification and its technical category. 5. Mark the alignment, chainage and main horizontal alignment elements on a map.

	6. Sketch a typical road cross-section without dimensions. 7. Compile a checklist of data needed for a route investigation and assess the data sources. 8. Analyse a case showing how soil and water conditions affect road earthworks. 9. Arrange pavement layers in the correct order and identify the function of each. 10. Identify samples of road materials and create a matrix of their main properties. 11. Draw a simple road drainage scheme. 12. Compare the functions of a bridge, a culvert, a tunnel and a retaining wall. 13. Set out the sequence of road construction operations and identify quality control points. 14. Work in groups to match construction machines to specific tasks. 15. Estimate the hourly traffic flow rate from a 15-minute traffic count. 16. Prepare a matrix of road hazards and countermeasures as an introduction to road safety audits. 17. Classify road maintenance tasks as routine, periodic or seasonal. 18. Compile a photographic catalogue of road defects and analyse likely causes and consequences. 19. Prioritise repairs according to road condition and risk. 20. Make a qualitative comparison of two options using life-cycle criteria. 21. Assess the environmental and social impacts of a road project. 22. Create a climate risk register recording each hazard, its impact, its likelihood and an adaptation measure. 23. Create a basic digital record of a road asset using an open map or GIS. 24. Present the final team mini-project and take part in peer assessment. **IV. Independent learning and independent work** Independent learning competency helps students to develop self-improvement skills and increase the efficiency of their professional activities. Students perform independent tasks on their mobile devices under the guidance of a teacher, either in traditional or electronic form. Recommended topics for independent work: 1. Create an individual infographic mapping road engineering careers and employers. 2. Prepare a photographic report on the function, category and main elements of a selected road section. 3. Compile a source register covering the laws, standards and organisations relevant to the road sector. 4. Sketch a road cross-section and its drainage arrangement, with an explanatory note. 5. Create a matrix comparing pavement structures and materials. 6. Carry out a short traffic count, tabulate the observations and draw a conclusion. 7. Work in a group to map the hazards a vulnerable road user faces. 8. Prepare a group photographic catalogue of road defects and propose a preliminary technical recommendation. 9. Draw a concept diagram linking the road life cycle to preventive maintenance.

	10. Work in a group on a case study of a road engineering solution that is resilient to climate and environmental hazards. 11. Create digital inventory records for five road assets using GIS or an open map. 12. Complete the final group mini-project, 'A Concept for Improving a Local Road'. 13. Assignments 7, 8, 10 and 12 are completed collaboratively in small groups. Together they account for one third of the twelve independent study assignments.
Exam form	Written
Teaching/learning and examination requirements	Complete mastery of theoretical and methodological concepts and practical knowledge of the discipline, the ability to correctly reflect the results of analysis, independently reason about the processes being studied and carry out tasks in the current, intermediate forms of control and independent work, pass written work on the final control. When drawing up final exam questions, deviations from the content of the discipline program are not allowed. The bank of final exam questions for each discipline is discussed at the meeting and approved by the head of the department. No later than 1 week before the start of the final control, tickets signed by the head of the department, enclosed in an envelope, are sealed by the Dean's office and opened 5 minutes before the start of the exam in the presence of students. Final exam duration is 80 minutes. Answers to final exam questions are recorded in copybooks with the seal of the Dean's office. After completion of the final work, the work is immediately encrypted by a representative of the Dean's office, and the copybooks are handed over to the commission for verification. From the moment of completion of the final exam, a period of 72 hours is allotted for checking and posting the results on the electronic platform. The teacher who taught the students in this discipline is not involved in the process of conducting the exam and checking the students' answers. Student(s) who are dissatisfied with the final exam results may submit a written or oral appeal within 24 hours of the publication of the final exam results. Complaints submitted after 24 hours from the publication of the final exam results will not be accepted.
Scope of assessment criteria and procedure	CURRENT CONTROL Purpose: Determining and assessing the student's level of knowledge, practical skills, and competencies on course topics. Instructions: The student's activity in daily classes is assessed through the student's mastery of course topics, as well as constructively interpreting and analyzing the educational material, developing module specific skills, acquiring practical skills (in terms of quality and the specified number) and competencies, solving problem situations aimed at applying professional practical skills, working in a team, preparing presentations, etc. Current control form: Activity in lessons; Preparing educational materials; Working with sources within the subject; Using educational technologies; Working in a team Preparing presentations; Working with projects. MIDTERM CONTROL Purpose: Assessing the student's knowledge and practical skills and level of mastery of lecture material after completing the relevant section of the course. Form and procedure of intermediate control: Midterm examination is held during the semester during the training sessions after the completion of the relevant module of the curriculum of the subject. Midterm examination

is held once in written form within the framework of this subject. Midterm examination questions cover all topics of the subject.

INDEPENDENT LEARNING

Purpose: Independent learning is aimed at fully covering the content of this course, expanding the theoretical knowledge acquired, and establishing independent learning activities for students.

Form and procedure of independent education: independent work assignments are completed in the form of an educational project, presentation, case study, problem solving, information search, digest, colloquium, essay, article, abstract, etc. Completed assignments for independent study are placed in the electronic system and checked based on the anti-plagiarism program and evaluated by the subject teacher.

In this case, the uniqueness of the completed assignment should not be less than 60%, otherwise the assignment will not be accepted for assessment. The number of independent work assignments, depending on the nature of the subject, should not be less than 3 for one subject (module). Independent work assignments account for 60% of the points allocated for current and intermediate control.

FINAL CONTROL

Purpose: The final examination is held at the end of the semester to determine the level of mastery of the student's theoretical knowledge and practical skills in the relevant subject. The final examination is held at a specified time according to the examination schedule created by the Registrar's Office on the electronic platform.

Requirements: The student must have passed the current control, intermediate control and independent learning assignments by the deadline for the final control type in the relevant subject. A student who has not passed the current control, intermediate control and independent learning assignments, as well as who has received a score in the range of "0-29,9" for these assignments and control types, is not included in the final control type. Also, a student who has missed 25 percent or more of the classroom hours allocated to a subject without a reason is excluded from this subject and is not included in the final control type and is considered not to have mastered the relevant credits in this subject. A student who has not passed or was not included in the final control type and has received a score in the range of "0-29.9" for this type of control is considered to be an academic debtor.

Final control form: The final examination in this subject will be conducted in written form. If the final examination is conducted in written form, the requirements for assessment must also be reflected.

Criteria for assessing student knowledge

5 grade	100 points		Assessment criteria
5	90-10	Excellent	When a student is considered to be able to make independent conclusions and decisions, think creatively, observe independently, apply the knowledge he has gained in practice, understand, know, express, and narrate the essence of the subject, and have an idea about the subject.
4	70-89,9	Good	When the student is considered to be

				able to observe independently, apply the knowledge he has gained in practice, understand, know, express, and narrate the essence of the subject, and has an idea about the subject
	3	60-69,9	Satisfactory	When the student is found to be able to apply the knowledge he has gained in practice, understands, knows, can express, and narrate the essence of the subject, and has an idea about the subject.
	2	0-59,9	Unsatisfactory	When it is determined that the student has not mastered the science program, does not understand the essence of the subject, and does not have an idea about the science.

Course assessment criteria and procedure

Assessment type	Total points allocated	Control (task) form	Distribution of points	Qualifying score
Current assessment	30 points	System tasks	20 points (divided by number of tasks)	18 points
		Student activity (in seminars, practical, laboratory classes)	10 points	
Midterm assessment	20 points	Supervision: writing work	10 points	12 points
		System tasks	10 points (divided by number of tasks)	
Final assessment	50 points	Written assignment (5 questions)	50 points (10 points per question)	30 points

* Note: 60% of the points allocated for current and intermediate control are allocated to independent work assignments. Independent work assignments are evaluated as system assignments through the electronic platform.

Recommended Literature	1. Ганиев И. Г. Введение в дорожную инженерию. Учебник. Джизакский политехнический институт. Джизак, ДжизПИ, 2026. 304 с. 2. G‘aniyev I., G‘ulomov D. Yo‘l muhandisligiga kirish. O‘quv qo‘llanma. Jizzax politexnika instituti. Jizzax, JizPI, 2026. 189 b. 3. Roess R. P., Prassas E. S., McShane W. R. Traffic Engineering. 5th ed. Pearson, 2021. ISBN 978-0-13-751878-4. 4. Imperial College London. CIVE60008 — Transport Systems. Undergraduate module. Electronic resource. 5. ETH Zürich, Institute for Transport Planning and Systems. Course of Studies: Transportation Study Paths. Electronic resource.