Name of subject	**HIGHWAY LANDSCAPING AND ROADSIDE EQUIPMENT (11 ECTS)**
Subject/module code	**AYK27811**
Science taught semester (s).	7th and 8th semesters
Module leader	D. G‘ulomov, PhD, Acting Associate Professor, Department of Road Engineering
Education language	Uzbek
Connection to the curriculum	Elective
Training hours (this including independent education)	**Total hours – 330 hours** **Contact hours – 132 hours** Lecture training hours – 60 hours Practical training hours – 72 hours **Independent education – 198 hours**
Course work	No
ECTS	11
The purpose and tasks of subject / learning outcomes	**The purpose of teaching the subject is** to develop the competence to plan highway and roadside landscaping and equipment for safety, comfort, accessibility and maintenance, coordinate the elements and justify solutions with evidence. **The objectives of teaching the subject** are to identify the initial inventory and applicable requirements. Select signs, markings, delineation devices, safety barriers and lighting. Plan pedestrian and cycling routes, public-transport stops, rest areas and service sites. Consider drainage, landscape, noise and seasonal conditions. Define installation, acceptance, inventory and maintenance needs. Compare two options in terms of safety, energy and life-cycle cost. **Learning outcomes:** 1. Identify the site inventory and user needs. Prepare a requirements table distinguishing the scopes of highway, urban-street and lighting standards. 2. Position roadside elements on a site plan. Identify conflicts involving visibility, clear zones, pedestrian routes, water and utilities. 3. Justify sign, marking and delineation layouts and quantities. Check supplied visibility or measurement results against the relevant criteria. 4. Compare measures to reduce roadside hazards. Distinguish vehicle safety barriers, their working width, terminals and transitions from pedestrian railings. 5. Analyse supplied photometric results, uniformity, glare and energy use separately for a lighting option. Explain the model’s limitations. 6. Coordinate continuous routes, crossings and stop facilities for pedestrians, cyclists and people with disabilities on a diagram. 7. Plan entry and exit, internal movement, pedestrian provision and servicing for a rest area, car park or service site using supplied requirements. 8. Assess how drainage, slopes, planting, noise and seasonal factors affect equipment safety and maintenance. Identify specialist checks needed. 9. Prepare installation, quality-control, acceptance and inventory records. Distinguish evidence, measurements, certificates and subsequent maintenance tasks. 10. Compare two equipment options in terms of safety, comfort, supplied costs and service-life conditions. Defend the portfolio and individual contribution.
Course content (topics)	**I. Main Theoretical Part (Lecture Sessions).**

	Topics: 1. Purpose of highway landscaping and roadside equipment. 2. Road zones and legal framework. 3. Initial inventory. 4. Users and site conditions. 5. Coordinated layout. 6. Road signs. 7. Road markings. 8. Delineation devices. 9. Visibility and measurement. 10. Roadsides and safety barriers. 11. Fundamentals of road lighting. 12. Luminaire and column positioning. 13. Pedestrian and cycling facilities. 14. Public-transport stops and waiting areas. 15. Rest areas and service facilities. 16. Runoff and drainage. 17. Slope and roadside protection. 18. Landscape and planting. 19. Noise and dust reduction. 20. Environmental and sanitary conditions. 21. Digital traffic-control equipment. 22. Energy and resources. 23. Street and roadside furniture. 24. Maintenance and special requirements. 25. Traffic during installation. 26. Materials and fixings. 27. Quality control and acceptance. 28. Inventory and maintenance. 29. Life-cycle cost. 30. Integrated solutions. **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. Prepare a site inventory recording equipment type, identifier, coordinates, condition, source and missing information. 2. Prepare a requirements table distinguishing highway and urban-street contexts, zones, users and the scope of the applicable standards. 3. Record conflicts between equipment, trees, drainage, utilities and pedestrian routes on a site plan and cross-section. Develop layout options. 4. Map user routes and coordinate the needs of pedestrians, cyclists, bus and car users, and maintenance staff.

	5. Prepare a sign layout and quantities. Link visibility, supports, information consistency and sign or marking requirements to the source. 6. Calculate marking layout and area using the supplied material-consumption data. Address wet and night-time visibility and maintenance conditions. 7. Prepare a delineation-device layout. Check colour, retroreflectivity and observation conditions in the supplied measurements. 8. Compare options to remove, relocate or shield a roadside hazard, using evidence to justify each option. 9. Prepare a check record for a supplied barrier system, covering space, deflection or working width, terminals, transitions and maintenance access. 10. Analyse mean and minimum values and uniformity from a supplied photometric grid. Identify the information required to assess glare. 11. Compare the layouts and annual energy use of two lighting options using supplied parameters. Assess column-related traffic risks and maintenance. 12. Check conflicts between ramps, tactile information, railings and equipment at a crossing or along a pedestrian and cycling route. 13. Compare two arrangements for a stop shelter, platform, access route, information and lighting in an urban-street or highway setting. 14. Develop a rest-area or service-site concept with entry and exit, separation of vehicles and pedestrians, parking, sanitation and equipment quantities. 15. Coordinate the flow path, equipment foundations, inlets and outlet on a diagram. Analyse the supplied discharge and blockage scenario. 16. Select a protection option for slope, erosion and seasonal snow or sand conditions. Identify geotechnical or hydraulic checks required. 17. Coordinate landscape and irrigation layouts with equipment and visibility. Account for tree growth, roots, water and maintenance constraints. 18. Identify space, receivers, openings and measurements needed for a barrier or another measure in a noise or environmental case. 19. Prepare a record for digital equipment or controlled lighting covering power, communications, measurement quality, failure and maintenance. 20. Set out equipment installation or replacement steps. Address temporary traffic management, pedestrian continuity, technical access and control points. 21. Prepare a material and fixing specification using supplied actions, corrosion conditions, compatibility, manufacturer documents and test evidence. 22. Prepare an acceptance and inventory package with as-built drawings, measurements, defects, conformity documents, corrective action and service-history records. 23. Calculate life-cycle costs and sensitivity for two options using supplied prices and energy, maintenance and replacement conditions. 24. Defend an individual portfolio, justifying the site plan, quantities and calculations, two options, coordination and acceptance requirements, and maintenance plan. **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. Prepare a requirements table and user map for a selected section, identifying road type, zone, national sources, constraints and a preliminary plan. 2. Prepare an equipment inventory and sign, marking and barrier layouts. Record identifiers, quantities, visibility, conflicts and each member's contribution. 3. Compare two lighting options using supplied photometry, energy, column locations and maintenance conditions. Explain uncertainty 4. Prepare a conceptual rest-area or service-site plan with entry and exit, large vehicles, pedestrians, sanitation and an equipment list. 5. Coordinate a stop and pedestrian or cycling route with drainage, landscape and equipment. Present two options and individual explanations. 6. Critically review research article, addressing its purpose, measurement or trial conditions, findings, uncertainty and limits of local application. 7. Analyse a supplied water, erosion, planting or noise-protection case. Propose a measure, specialist checks and a seasonal maintenance plan. 8. Prepare an installation, acceptance and maintenance package with an inventory record, measurement and conformity evidence, technical access, replacement and a cost scenario. Submit and defend an individual final portfolio with a site plan, checked quantities and calculations, two options, maintenance plans and an account of personal contributions
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	

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<tr><td rowspan="2">Midterm assessment</td><td rowspan="2">20 points</td><td>Supervision: writing work</td><td>10 points</td><td rowspan="2">12 points</td></tr>
<tr><td>System tasks</td><td>10 points (divided by number of tasks)</td></tr>
<tr><td>Final assessment</td><td>50 points</td><td>Written assignment (5 questions)</td><td>50 points (10 points per question)</td><td>30 points</td></tr>
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* 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.
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<tr><td>Recommended Literature</td><td>
1. SHNQ 2.05.02-23. Avtomobil yo‘llari. Loyihalash talablari (Highways. Design Requirements). Ministerial Order No. 01/2-61 of 23 August 2024. Effective from 14 October 2024.lex.uz/docs/-7205692
2. SHNQ 2.04.18-22. Shaharlar va qishloqlarda aholi yashaydigan joylarni tashqi yoritish (Outdoor Lighting of Urban and Rural Settlements). Ministerial Order No. 115 of 23 June 2022. Effective from 4 July 2022. lex.uz/docs/-6091708
3. Austroads. Guide to Road Design Part 6B. Roadside Environment. Edition 2.2, 26 June 2026. AGRD06B-26. ISBN 978-1-923617-43-8. austroads.gov.au · AGRD06B
4. Austroads. Guide to Road Design Part 6. Roadside Design, Safety and Barriers. Edition 5.0, 26 June 2026. AGRD06-26. ISBN 978-1-923617-41-4.austroads.gov.au · AGRD06
5. Gibbons R., McLean D., Lutkevich P. J., Bhagavathula R., Keith D. 2023 FHWA Lighting Handbook. Federal Highway Administration, Office of Safety, February 2023. FHWA-SA-23-004. rosap.ntl.bts.gov · FHWA Lighting Handbook
6. Republic of Uzbekistan. Law O‘RQ-1162 of 5 August 2026, Avtomobil yo‘llari to‘g‘risida (On Highways). LexUZ revision of 6 August 2026. Roadside areas and infrastructure.lex.uz/docs/-8377546
7. SHNQ 2.07.06-24. Shahar ko‘cha yo‘llari. Harakat xavfsizligi 3-qism (Urban Streets. Traffic Safety, Part 3). Order No. 01/2-86 of 27 December 2024. Effective from 20 January 2025. Applied to urban-street cases. lex.uz/docs/-7327695
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