Name of subject	ROAD ASSET MANAGEMENT (ECTS 8)
Subject/module code	**YAB1308**
Science taught semester (s).	2nd and 3rd semesters
Responsible teacher	Ganiyev Inomjon Gulomovich – head of the department "Road engineering", PhD, professor
Education language	Uzbek
Connection to the curriculum	Compulsory
Training hours (this including independent education)	**Total hours – 240 hours** **Contact hours – 72 hours** Lecture training hours – 36 hours Practical training hours – 36 hours **Independent education – 168 hours**
Course work	Yes - "Development of a risk- and life-cycle-based road asset management plan for a selected road network or section".
ECTS	8
The purpose and tasks of subject / learning outcomes	**The purpose of teaching the subject is** To develop competence for strategic and systematic management of road and aerodrome assets—including pavements, bridges, culverts, drainage, roadside equipment, lighting, barriers and ITS—based on value, service level, condition, performance, risk and life-cycle cost **The objectives of teaching the subject** are to develop an understanding of assets, value, stakeholders, management systems, decision-making, and organizational maturity based on the principles of ISO 55000:2024 and ISO 55001:2024; establish asset portfolios, hierarchies, inventories, unique identifiers, and spatial data models; assess the condition and performance of pavements, bridges, and ancillary assets; manage data quality and uncertainty; forecast deterioration and remaining service life; define levels of service and performance targets and identify performance gaps; analyze risks, asset criticality, and climate vulnerability; undertake life-cycle planning and life-cycle cost analysis (LCCA), prepare financial plans, and develop multi-year investment strategies under budget constraints; integrate pavement and bridge management systems (PMS/BMS), geographic information systems (GIS), building and civil information modelling (BIM/CIM), digital twins, and data from sensors, drones, and LiDAR; and develop a conceptual Transportation Asset Management Plan for a selected road network. **Learning outcomes:** 1. Formulate road-asset management objectives, value, service level, stakeholder needs and decision authority using ISO 55000-family principles. 2. Develop an asset portfolio, hierarchy, identifiers, attributes, geographic location and data dictionary for road/aerodrome assets. 3. Reliably assess condition and performance of pavements, bridges, culverts, drainage, barriers, signs, lighting and ITS assets. 4. Evaluate data quality, completeness, accuracy, update frequency and uncertainty and justify an inspection program. 5. Forecast deterioration, remaining service life, service level and performance gaps using statistical or engineering models. 6. Assess risk, critical assets, consequences, probabilities, climate hazards and network resilience and develop a risk register. 7. Select preservation, repair, rehabilitation and replacement options using life-cycle planning and LCCA.

	8. Optimize a multi-year program, financial plan and investment strategy under constrained budgets. 9. Integrate PMS/BMS, GIS, BIM/CIM, digital twins, dashboards and remote-monitoring data into a unified decision environment. 10. Prepare and professionally defend a TAMP for a selected road network covering inventory, condition, objectives, risk, life cycle, finance, investment and monitoring.
Course content (topics)	**I. Main Theoretical Part (Lecture Sessions).** Topics: 1. Introduction to road asset management 2. Strategic asset management 3. Asset portfolios and inventory 4. Asset data and quality management 5. Pavement condition and performance 6. Bridge and structural assets 7. Ancillary asset management 8. Condition monitoring and data-collection technologies 9. Deterioration modelling and remaining service life 10. Service level, targets and performance gap 11. Life-cycle planning and treatment strategies 12. Risk-based asset management 13. Climate resilience 14. Economic analysis and financial planning 15. Investment strategy and budget optimization 16. Digital asset management 17. Transportation Asset Management Plan and international practice **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. Define asset portfolio, hierarchy and management boundary 2. Build GIS inventory database, identifiers and data dictionary 3. Perform asset data-quality audit 4. Classify pavement defects and calculate PCI/equivalent condition index 5. Develop pavement performance profile from IRI/rutting/cracking/strength/skid data 6. Determine bridge condition rating and priority 7. Develop condition-assessment form for ancillary assets 8. Justify inspection and monitoring programme 9. Forecast deterioration and remaining service life in a spreadsheet/software environment 10. Develop service-level, KPI and performance-gap table

	11. Develop treatment strategy using library, trigger and decision tree 12. Prepare risk matrix, critical-asset list and climate-vulnerability map 13. Perform LCCA for alternative preservation/rehabilitation strategies 14. Prioritise projects under constrained budget and develop a 3–5 year programme 15. Visualise condition, risk, plan and cost in a GIS/dashboard 16. Develop concept for linking asset history to BIM/CIM/digital twin 17. Integrate core TAMP sections 18. Course-work technical review, expert review, presentation and defence **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. Compare ISO 55000/55001 and AASHTO TAM principles 2. Develop asset registry, hierarchy, GIS layers and data dictionary 3. Condition profile and data-quality audit for pavements 4. Inspection and condition-rating methodology for bridges/ancillary assets 5. Deterioration, remaining-service-life and performance-gap scenarios 6. Treatment library and preventive maintenance/rehabilitation strategy 7. Risk register and climate-vulnerability/adaptation plan 8. LCCA, NPV and deferred-maintenance impact 9. Multi-year investment programme and financial plan 10. Information architecture integrating PMS/BMS, GIS, BIM/CIM and dashboards 11. International TAMP case study 12. Finalise TAMP, maps, calculations, KPIs, risk, financial plan and defence
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

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<tr><td></td><td>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.</td></tr>
<tr><td>Criteria for assessing student knowledge</td><td>
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<tr><th>5 grade</th><th>100 points</th><th></th><th>Assessment criteria</th></tr>
<tr><td>5</td><td>90-10</td><td>Excellent</td><td>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.</td></tr>
<tr><td>4</td><td>70-89,9</td><td>Good</td><td>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</td></tr>
<tr><td>3</td><td>60-69,9</td><td>Satisfactory</td><td>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.</td></tr>
<tr><td>2</td><td>0-59,9</td><td>Unsatisfactory</td><td>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.</td></tr>
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<tr><td>Course assessment criteria and procedure</td><td>
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<tr><th>Assessment type</th><th>Total points allocated</th><th>Control (task) form</th><th>Distribution of points</th><th>Qualifying score</th></tr>
<tr><td>Current assessment</td><td>30 points</td><td>System tasks</td><td>20 points (divided by</td><td>18 points</td></tr>
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<tr><td></td><td></td><td></td><td>number of tasks)</td><td></td></tr>
<tr><td></td><td></td><td>Student activity (in seminars, practical, laboratory classes)</td><td>10 points</td><td></td></tr>
<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>

Ganiyev, I. Yo‘l aktivlarini boshqarish / I. Ganiyev. — Jizzakh: So‘g‘diyona NMU, 2024. 344 b.
ISO 55000:2024. Asset management — Vocabulary, overview and principles. — 2nd ed. — ISO, 2024. — 13 p.
ISO 55001:2024. Asset management — Asset management system — Requirements. — 2nd ed. — ISO, 2024. — 18 p.
ISO 55013:2024. Asset management — Guidance on the management of data assets. — 1st ed. — ISO, 2024. — 20 p.
PIARC. Asset Management Manual: A Guide for Practitioners [Elektron resurs]. — URL: https://road-asset.piarc.org/en
Austroads. Guide to Asset Management: in 15 parts. — 3rd ed. — Austroads, 2018.

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