Name of subject	**Safety regulations for the operation of electrical equipment (ECTS 5)**
Subject/module code	EQETFQ2605
Science taught semester (s).	6th semester
Responsible teacher	Khonturaev Ikromjon Munavarovich, Senior teacher
Education language	Uzbek
Connection to the curriculum	Elective
Training hours (this including independent education)	**Total hours-150** **Audience Training hours – 60** Lecture training hour – 30 Practical training hour – 30 **Independent education -90 hours**
ECTS	5
The purpose and tasks of subject / learning outcomes	**Purpose of teaching the subject** – is to provide each future power engineer (i.e., student) with the theoretical foundations of knowledge about the risks associated with working on electrical equipment, to teach the basic concepts of safety, the groups and categories assigned to workers, and the rules of electrical safety, as well as to develop practical skills in applying this knowledge. **The objectives of the subject** are to study the effect of electric current on the human body, methods of providing first aid to individuals injured by electric shock or involved in other accidents, the procedure for issuing work permits and orders, the execution of short-term and urgent tasks, and the preparation of workplaces and granting permission to begin work. It also includes understanding organizational measures to be taken when performing work on electrical equipment at power plants, substations, and in cable power networks; carrying out operational services and assigned tasks; appointing responsible supervisors for work performed at power plants, substations, and cable networks; as well as determining organizational actions and assigning responsible personnel when working on overhead power transmission lines. The course covers ensuring electrical safety when performing tasks on overhead transmission line poles, the safety of operations involving electric motors, switching devices, and complete distribution equipment, as well as direct work on current transformers.Additionally, students will learn to identify technical measures for switching off electrical equipment, general requirements for grounding devices, types of electrical protective equipment, the standards and rules for their use, application, testing, and measurement of protective equipment used in electrical installations. Finally, the course teaches about the responsibilities, rights, and duties of the persons in charge of ensuring the safe completion of work from beginning to end. Learning Outcomes: 1. Understanding the relevance of studying safety regulations in the electric power system. 2. Familiarizing with the role of electric energy in society and its socio-economic significance. 3. Studying the state policy in the energy sector, along with development trends and prospects both nationally and globally.

	4. Learning how to operate electrical equipment based on safety regulations. 5. Acquiring skills to provide first aid to a person based on safety rules.
Course content (topics)	**I. Main Theoretical Part (Lecture Sessions)** Topics: 1. Organization of Work with Employees of Energy Enterprises and Organizations 2. The Effect of Electric Current on the Human Body 3. Providing First Aid to a Person Affected by Electric Current 4. Protection Systems for Enclosed Enterprises 5. Safety Control During Work on Electrical Equipment at Power Plants and Substations 6. Electrical Safety Rules for Work on Cable Networks 7. Organizational Measures for Work on Overhead Power Transmission Lines. Appointment of a Supervisor 8. Electrical Safety When Working on Electric Motors, Switching Devices, Distribution Equipment, and Current Transformers 9. Electrical Safety of Switching Devices and Distribution Equipment 10. Technical Measures for Disconnecting Electrical Equipment 11. Checking for the Absence of Voltage During Disconnection of Electrical Equipment 12 General Requirements for the Installation of Grounding Devices 13. Installation of Grounding Devices at Power Plants and Substations 14. Use and Testing of Electrical Protective Equipment. Electrical Testing 15. Personal Protective Equipment **II. Instructions and recommendations for organizing laboratory exercises.** Laboratory work is not included in the curriculum **III. Practical training instructions and recommendations** **Methodological guidelines and recommendations** for conducting practical training sessions have been developed by the department's professors and teaching staff. These guidelines enable students to apply the theoretical knowledge gained from lectures by solving practical problems and acquiring relevant skills.In addition, students are encouraged to reinforce their knowledge by studying textbooks and teaching aids, using handouts, publishing scientific articles and theses, solving problems, and preparing visual aids related to the topics covered. These activities are recommended to enhance and deepen students' understanding of the subject. Recommended Practical Topics: 1. Analyze industrial accidents and determine injury indicators through solving sample problems and completing independent assignments to develop the necessary skills. 2. Solve sample problems related to fire protection in industrial buildings and independently complete homework assignments to acquire practical skills. 3. Solve sample problems related to protective grounding and independently complete the given tasks to develop relevant competencies. 4. Solve sample problems on protective neutral grounding and complete independent assignments to gain necessary skills. 5. Solve sample problems on protective disconnection and independently carry out assigned tasks to build practical competencies.

6. Conduct electrical safety analysis of IT and TN-C network types by solving relevant sample problems and performing independent assignments.
7. Solve sample problems related to ground leakage current, touch voltage, and step voltage, and complete assigned homework independently to develop skills.
8. Solve sample problems on the spreading resistance of hemispherical grounding electrodes and work independently on homework to acquire practical experience.
9. Calculate the disconnection capability of protective neutral grounding by solving sample problems and performing related independent tasks.
10. Select protective devices for electrical equipment through solving sample problems and carrying out independent tasks to develop proper technical decision-making.
11. Calculate the grounding system of a 10/0.4 kV substation by solving sample problems and independently completing homework to master the required skills.
12. Calculate the grounding system of a 35/10 kV substation through solving corresponding sample problems and developing practical skills via independent work.
13. Solve sample problems on the calculation of protective grounding devices and complete independent assignments to build necessary competencies.
14. Apply the statistical method for grounding calculations by solving sample problems and performing independent tasks to gain technical proficiency.
15. Calculate the hazard indicators of static electric charges by solving sample problems and working independently on related tasks to acquire relevant skills.

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 study:

1. General Requirements for Electrical Safety
2. Electrical Safety Requirements for Employees
3. Terms and Abbreviations Used in the Energy Sector
4. Electrical Safety Groups for Personnel Servicing Electrical Equipment
5. List of Jobs and Professions with Hazardous and Harmful Working Conditions Prohibited for Persons Under 18 Years of Age
6. Effect of Electric Current on the Human Body
7. Providing First Medical Aid to a Person Affected by Electric Current
8. General Rules for Providing First Aid in Case of Electric Shock and Other Accidents
9. Rules for Performing Artificial Respiration in Case of Electric Shock
10. Methods of Rescuing a Person from Electric Shock
11. First Aid Measures for Electric Shock Victims
12. Procedures for Administering First Aid in Case of Electric Injuries
13. Electrical Safety Rules During Emergency Service Operations
14. Procedure for Performing Work
15. Responsible Personnel for Ensuring Safe Execution of Work from

	Start to Finish **16.** Rights and Responsibilities of Responsible Personnel **17.** Procedure for Issuing Work Permits and Orders **18.** Instructions for Completing Work Permits (Naryad-Ijozat Forms) **19.** Safety Rules for Short-Term and Urgent Work **20.** Composition of the Work Team **21.** Safety Rules for Preparing the Workplace and Granting Permission to Begin Work
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	90-100	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 the number of tasks)	18 points
		Student activity (in seminars, practical, laboratory classes)	10 points	
Midterm assessment	20 points	Supervision: Written work	10 points	12 points
		System tasks	10 points (divided by the 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

Main literature:

1. Steven W. Blume. Electric power system basics // USA, 2007.
2. Karimov R.Ch., Rafiqova G.R. Elektr xavfsizligi asoslari. O'quv qo'llanma. – T.: Spectrum Media Group. 2015.
3. Elektr qurilmalarni ekspluatatsiya qilishda xavfsizlik texnikasi qoidalari // «O'zdavenergonazorat» elektr energetikada nazorat bo'yicha davlat inspeksiyasi. - T.: Mehnat. 2016.
4. Elektr energetika uskunalariga xizmat ko'rsatishda yuz bergan baxtsiz hodisalar oqibatida jabrlanganlarga shifokordan oldin yordam ko'rsatish bo'yicha yo'riqnoma // «O'zdavenergonazorat» elektr energetikada nazorat bo'yicha davlat inspeksiyasi. - T.: Mehnat. 2016.
5. Iste'molchilar elektr qurilmalarini ekspluatatsiya qilishda xavfsizlik texnikasi qoidalari // «O'zdavenergonazorat» elektr energetikada nazorat bo'yicha davlat inspeksiyasi. - T.: Mehnat. 2016.
6. Iste'molchilar elektr qurilmalarini texnik ekspluatatsiya qilish qoidalari // «O'zdavenergonazorat» elektr energetikada nazorat bo'yicha davlat inspeksiyasi. - T.: Mehnat. 2016.
7. Energetika ob'ektlarida elektr ta'mirlash ishlarini olib borishda xavfsizlik texnikasi qoidalari // «O'zdavenergonazorat» elektr energetikada nazorat bo'yicha davlat inspeksiyasi. - T.: Mehnat. 2016.
8. Elektr uskunalarining tuzilish qoidalari // «O'zdavenergonazorat» elektr energetikada nazorat bo'yicha davlat inspeksiyasi. - T.: Mehnat. 2016.
9. G. Stokes, J. Bradley, A Practical Guide to the Wiring Regulations: 17th Edition IEE Wiring Regulations (BS

7671:2008), Wiley-Blackwell, 4th edition, 2009
10. G.C. Barney, Elevator Traffic Handbook: Theory and Practice, Routledge, 2nd edition, 2016
11. The SLL Lighting Handbook, The Society of Light and Lighting, Chartered Institution of Building Services Engineers, 2018

Additional literature:

12. Sh.M.Mirziyoev. Erkin va farovon, demokratik O‘zbekiston davlatini birgalikda barpo etamiz // O‘zbekiston Respublikasi Prezidentining lavozimiga kirishish tantanali marosimiga bag‘ishlangan Oliy Majlis palatalarining qo‘shma majlisidagi nutqi. –T.: “O‘zbekiston” NMIU, 2016. – 56 bet.
13. Sh.M.Mirziyoev. Qonun ustuvorligi va inson manfaatlarini ta’minlash – yurt taraqqiyoti va xalq farovonligining garovi // O‘zbekiston Respublikasi Konstitut-siyasi qabul qilinganining 24 yilligiga bag‘ishlangan tantanali marosimdagi ma’ruzasi, 2016 yil 7 dekabr. – T.: “O‘zbekiston” NMIU, 2016, – 48 bet.
14. Sh.M.Mirziyoev. Buyuk kelajagimizni mard va olijanob xalqimiz bilan birga quramiz // – T.: “O‘zbekiston” NMIU, 2017, – 488 bet.
15. O‘zbekiston Respublkasini yanada rivojlantirish bo‘yicha harakatlar strategiyasi to‘g‘risida // – T.: 2017 yil 7 fevral, PF-4947- sonli Farmoni.
16. T.M.Qodirov, H.A.Alimov. Sanoat korxonalarining elektr ta’minoti // O‘quv qo‘llanma. –T.: ToshDTU bosmaxonasi, 2006.
17. К.Р.Аллаев. Электроэнергетика Узбекистана и мира // – T.: «Фан ва технология, 2009.
18. A.D.Taslimov, A.N.Rasulov, E.G.Usmonov. Elektr ta‘minoti // O‘quv qo‘llanma. –T.: «ILM ZIYO» nashriyoti. 2012.
19. F.A.Xoshimov, A.D.Taslimov. Energiya tejamkorligi asoslari // O’quv qo’llanma, - T.: «Voris-nashriyot», 2014.
20. X.G.Karimov, A.N.Rasulov, A.D.Taslimov. Elektr tarmoqlari va tizimlari // O’quv qo’llanma, - T.: “Tafakkur qanoti” nashriyoti, 2015.

Internet resources:

21. www.ziyonet.uz – milliy o‘quv materiallarini qidiruv sayti.
22. www.gov.uz – O‘zbekiston Respublikasining hukumat portali.
23. www.google.com – xalqaro o‘quv materiallarini qidiruv sayti.
24. www.energystrategy.ru – “Energetika siyosati va strategiyasi” axborot portali
25. www.twirpx.com – xalqaro o‘quv materiallarini qidiruv sayti.