

<b>Name of subject</b>	<b>Energy management (ECTS 6)</b>
<b>Subject/module code</b>	EM1106
Science taught semester (s).	1 <sup>st</sup> semester
Responsible teacher	Abdullaev Elnur Akhmatovich (PhD), associate professor.
Education language	Uzbek
Connection to the curriculum	Compulsory
Training hours (this including independent education)	<b>Total hours-180</b> <b>Contact hours – 54</b> Lecture training hour – 28 Practical training hour – 26 <b>Independent education -126 hours</b>
ECTS	6
The purpose and tasks of subject / learning outcomes	<p>The purpose of teaching the subject is to teach the main concepts of energy management in the consumption of electric energy, in the efficient use of energy, in the standardization of consumption by energy forms, in automated control systems, in the use of secondary energy resources, the fundamental nature of the ongoing energy saving policy. is to create skills on the role and importance of energy management in teaching and implementing energy saving measures in practice.</p> <p>The task of the subject is to teach energy management, to regulate consumption by energy forms, to use secondary energy resources, to teach students information about the technical and economic efficiency of introducing energy management in household, public and industrial enterprises. consists of.</p> <p><b>Learning outcomes:</b></p> <ol style="list-style-type: none"> <li>1. Development of measures to increase and popularize energy efficiency</li> <li>2. Identification and elimination of power loss in the electricity supply system</li> <li>3. Role of energy management in society and socio-economic importance</li> <li>4. Study of energy management using modern computer programs</li> <li>5. Studying the technical and economic indicators of energy management, their place in ecology and the principles of use</li> <li>6. Ability to perform energy monitoring</li> <li>7. Acquaintance with the mains of energy management</li> <li>8. To know and be able to use the existing main legal and regulatory documents in the field</li> </ol>
Course content (topics)	<p><b>I. Main Theoretical Part (Lecture Sessions)</b></p> <p><b>Topic 1:</b> Relevance of energy consumption issues</p> <p><b>Topic 2:</b> Energy management system.</p> <p><b>Topic 3:</b> Enterprise as an energy circulation system</p> <p><b>Topic 4:</b> Energy flows of production</p> <p><b>Topic 5:</b> Assessment of employee labor costs</p> <p><b>Topic 6:</b> Dynamic energy capacity and its recession</p> <p><b>Topic 7:</b> Factors affecting energy consumption of the enterprise</p> <p><b>Topic 8:</b> Energy consumption of the enterprise depending on the volume of production</p> <p><b>Topic 9:</b> Providing data for analysis</p> <p><b>Topic 10:</b> Enterprise energy management system databases</p> <p><b>Topic 11:</b> The content of the database of the enterprise's energy management system</p>

**Topic 12:** Main components of energy management and stages of development

**Topic 13:** Encouraging the employees of the enterprise in the field of energy saving

**Topic 14:** Development of energy saving measures

## **II. Practical training instructions and recommendations**

The teacher's preparation for a practical training session begins with the study of preliminary documents (curriculum, thematic plan, etc.) and ends with the development of a lesson plan. The teacher should have an idea of the goals and objectives of the practical training session, the amount of work that each student must perform.

Methodological guidelines are the main methodological document of the teacher in preparing and conducting practical training sessions.

The purpose of the practical training session is to understand the theory, acquire skills. It is to consciously apply it in educational and professional activities, and to develop the ability to confidently form one's own point of view.

### **The following topics are recommended for practical training:**

1. Calculation of electrical energy consumption
2. Energy balance of industrial enterprises
3. Issues of energy saving by compensation of reactive power in industrial enterprises
4. Tariffs for heat and electrical energy
5. Calculation of energy savings by using non-traditional energy sources in the energy supply of consumers
6. Calculation of the amount of payment according to the forms of consumed energy
7. The procedure for drawing up documents for connecting consumers to electricity networks
8. Rights and obligations of electricity consumers
9. Discounts and increases in electricity tariff for reactive energy compensation
10. Calculation and selection of cross-sectional areas of overhead lines and cables
11. Calculation and selection of the number and power of transformers

### **III. Independent learning and independent work.**

Independent learning competence serves to support students' independent self-development and increase the effectiveness of professional activities. Students perform independent work on their mobile devices under the guidance of a teacher in a traditional or electronic form.

#### **Recommended topics for independent study:**

1. Concept and structure of energy management
2. Overview of the ISO-50001 International Standard
3. Established definitions and prices for electricity consumption
4. Energy and power losses in the power supply system
5. General information on forecasting and regulation of electricity consumption
6. Concept and structure of energy audit, types of energy audit
7. Energy balance and its types
8. Compilation of energy passport of industrial enterprises and buildings
9. Concept of energy monitoring and stages of conducting energy monitoring
10. Main concepts and energy service contracts in the field of energy service
11. Fundamentals of investment project management and project change management in energy efficiency

	<p>12. Informational and marketing management of energy management and economic evaluation of energy efficiency</p> <p>13. Estimating the economic efficiency of investments in energy saving measures</p> <p>14. Calculation of energy consumption during energy audit</p> <p>15. Study of graphs of electrical loads of industrial enterprises</p> <p>16. Fundamentals of evaluating the technical and economic efficiency of energy saving measures</p> <p>17. Stages of energy monitoring. Checking of energy monitoring indicators.</p>
Exam form	Written
Teaching/learning and examination requirements	<p>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.</p> <p>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.</p> <p>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.</p> <p>The teacher who taught the students in this discipline is not involved in the process of conducting the exam and checking the students' answers.</p> <p>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.</p>
Scope of assessment criteria and procedure	<p><b>CURRENT CONTROL</b></p> <p>Purpose: Determining and assessing the student's level of knowledge, practical skills, and competencies on course topics.</p> <p>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.</p> <p>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.</p> <p><b>MIDTERM CONTROL</b></p> <p>Purpose: Assessing the student's knowledge and practical skills and level of mastery of lecture material after completing the relevant section of the course.</p> <p>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.</p>

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	<p><b>Main literature:</b></p> <ol style="list-style-type: none"> <li>1. Anarboyev A. I., Qodirov D. B. Energiya auditi. Study guide, TIQXMMI, 2023. 187 b.</li> <li>2. International standard ISO 50001. Energy management systems. Requirements and instructions for use. - SPb., 2011.</li> <li>3. State standard ISO 50001-2012. Energy management systems. National norm. Requirements and ISO 50001: 2011. Guidance on the application of energy management systems - Requirements with an Operation Guide (IDT).</li> <li>4. Energy audits. Practical guide for more energy efficient business. - European Union - 2023..</li> <li>5. Chuvilkin, A.V., Gordeev A.S. Sun'iy neyron tarmoqlardan foydalangan holda ob'ektlarning quvvat sarfini bashorat qilish // Zamonaviy fan va amaliyot savollari. 2015-yil. № 2 (12). Bb. 32-37.</li> <li>6. General Aspects of Energy Management and Energy Audit.</li> </ol> <p><b>Additional literature:</b></p> <ol style="list-style-type: none"> <li>7. Decree of the President of the Republic of Uzbekistan dated January 28, 2022 No. PF-60 "On the Development Strategy of New Uzbekistan for 2022-2026".</li> <li>8. Decree of the President of the Republic of Uzbekistan No. PF-220 dated 09.09.2022 "On additional measures for the introduction of energy-saving technologies and the development of small-capacity renewable energy sources".</li> <li>9. Xoshimov F.A., Taslimov A.D. Energiya tejamkorligi asoslari. O'quv qo'llanma. – T.: "Voriz", 2014 – 192 bet.</li> <li>10. Barney L. Caphart, Wayne C. Turner, William J. Kennedy. Guide to Energy Management. 2020.</li> </ol>				

	<p><b>Internet resources:</b></p> <p><a href="http://www.lex.uz">www.lex.uz</a> – National database of information on legal documents of the Republic of Uzbekistan.</p> <p><a href="http://www.ziyonet.uz">www.ziyonet.uz</a> – national educational materials search site.</p> <p><a href="http://www.gov.uz">www.gov.uz</a> – Government portal of the Republic of Uzbekistan.</p> <p><a href="http://www.twirpx.com">www.twirpx.com</a> – international educational materials search site.</p>
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