Fa name	Metrology and standardization. (ECTS 4)
Subject/module code	MS 1404
Science teachable semesters	4th semester
Attached teacher	Muxammadiyev Baxtiyar Saparovich, teacher, Murodova Aziza, assistant.
Education language	Uzbek
Connection to the curriculum	Compulsory
Study hours (including independent learning)	**Total hours - 120 .** **Auditory training hours -48.** Lecture training hours - 24 Laboratory training hours - 12 Practical training hours - 12 **Independent education - 72 hour**
ECTS	4
Science goals and objectives / learning outcomes	**The goal of teaching science is** to form and develop logical thinking and technological thinking in students, to teach them to clearly state their opinions and conclusions in a well-founded manner, and to include them in the content of science. **The task of science.** Within the framework of the issues to be addressed in the process of mastering the subject "Metrology and Standardization", the bachelor: - should know the types of measurements and test methods for evaluation; types of measurement systems developed in enterprises, their differences; types of audits and their procedures; procedures and stages of standardization of quality systems; procedures for inspection and control of standardization regulatory documents systems and the selection and use of international standards for specific conditions in these activities; - the student must have the skills to understand the requirements of the standards used in standardization; to organize the measurement system on a technical and economic basis based on the specifics of the product production technology; to understand and calculate production modes in the standardization of the measurement system; to correctly identify the objects of the system of regulatory documents taking into account technological parameters; It is important for students to master the subject of "Metrology and Standardization" to use advanced and modern teaching methods and introduce new information and pedagogical technologies. **Learning outcomes:** 1. "Metrology " and standardization ” science studies its development, history and prospects. 2. "Metrology " and standardization ” describes the concepts of science 3. "Metrology" and standardization ” can apply qualitative and quantitative methods of science 4. "Metrology" and standardization ” the basic standards of science describes and can explain the difference between 5. "Metrology" and standardization ” can analyze the properties of science. 6. "Metrology" and standardization ” the basic laws and rules of science can explain. 7. "Metrology" and standardization ” one of the sciences how many methods hand takes . 8. "Metrology" and standardization ” can analyze the use of science in the field.
Course content (themes)	**I. Home theoretical part (Lecture)**

Subject 1: Introduction. Goals and objectives of the subject of metrology and standard-ing. System for ensuring the unity of measurements.Green‖ economy policy as well as its main laws.

Subject 2: Size of size. Uses in the field of Metrology-ladigan basic terms and definitions.

Subject 3: The main task of Metrological provision. Concept in terms of Metrological supply, its functions. The main goals of Metrological supply.

Subject 4: Comparison of measuring instruments.Green‖ economy policy.

Subject 5: Stages of development of regulatory documents. Uzbek-kiston state system of standardization. Production of standards for "technical regulation".

Subject 6: Staying of international, regional, interstate, foreign regulatory documents. International Organization for Standardization / ISO/MEK/MOZM/.

Subject 7: Categories of Standards and their types. Technical aspect-from regulation,the concept of technical regulation.

Subject 8: Basic Laws and regulations of standardization. Standard-the essence of the law on the ingu.

Subject 9: State control over standards and measuring instruments. State Metrological examination and control application Sox and objects.

Subject 10: Preference aspects of standardization. Specific features of the standards. Standardization system.

Subject 11: Methods of standardization. Bar code of goods produced in the Respublika of Uzbekistan. Green‖ in the transition to the economy, to ensure energy efficiency.

Subject 12: International organizations on standardization. State Metrological service.

II. Guidelines and recommendations for organizing laboratory exercises.

In laboratory classes, students develop practical skills and competencies in conducting experiments, calculating and drawing tables and graphs. The recommended topics are selected based on opportunities and conditions.

Suggested topics for laboratory work:

1. Sound level meters for the device elements.
2. Ultrasound for the index of the thickness of metal and plastics. (Lee focusing 332) the device element.
3. Detektor defects of ultrasound, ct-yelementlari PLUS 9008 device.
4. Scales laboratory(VL)mg stones checking.
5. Betonni whose special wireless temperature measuring device.
6. Yelementlari moisture meters for the device.

III. Practical lessonfor ulot guidelines and recommendations.

The practical training of teachers to the initial preparation of documents (curriculum, plan a theme and others) start to learn from the developments with the conclusion of the lesson is completed. O‘qitish be applied mashg‘ulot the goals and objectives of each student must have an idea about the volume of work that you perform toe‘lish need.

Methodological ko‘rsatma o‘the chamber of practical qitish mashg‘preparation and ulot o‘- check-in passengers from the main methodological document.

The purpose of practical training to understand the theory, skills is to be able to. Educational and professional activities in it consciously apply their viewpoint consists of the formation of reliable boosting ability.

	Recommended practical topics : 1. Metrology in the field of used basic terms and definitions of the essence. 2. Metrological provision main purpose. 3. O‘lchov instruments metrological characteristics. 4. Standardization of the system about the basic information in place. 5. Standards and measurement of the means over state control in the importance of. 6. Standards approval and state listedyxati from the transfer procedure. **IV. Independent study and independent work.** Independent independent kompetensiya education students of self-development help and will serve to increase the effectiveness of professional activities. The traditional form of teacher leadership in the mobile device independent students or their work in electronic form shall perform. **Recommended topics for independent study:** 1. Learn the basic concepts and definitions of metrology. 2. Measurement types. 3. The standard, their types, procedures development, and to learn the rules of registration and order confirmation. 4. Learn the methods of standardization. 5. The study of certification schemes. 6. Standardization and coding of the information about the product. 7. The international organization for standardization and metrology. 8. Metrology and metrological supply 9. Description of modern measuring instruments and their 10. Due to the assessment of measurement uncertainty. 11. Review and ensure that the etalon one measure. 12. Technical regulations and to work them out 13. The role and importance of standards in quality management 14. Sertifkatlashtirish and its legal-normative supply. 15. Sertifkatlashtirish work in and out of place.
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

Basic literature:

1.Badalov.N.J. Metralogy and standardization. Darislik. 2023. 303 pp.

2.Ismatullaev P.R., Matyakubova P.M., Turaev SH.A. Metrology, standardization and certification. Textbook. "Lisson-press", Tashkent, 2015. -423b.
3.Abduvaliev A.A., Latipov V.B., Umarov A.S. I Dr. Osnovi standartizasii, metrologii, sertifikasii I Upravlenie kachestvom. - T.: NIISMS 2007. - 555 P.
4.Ismatullaev P.R., Kodirova SH.A. Fundamentals of Metrology. Tutorial. Tashkent," Tafakkur " publishing house 2012. -304 PP.
5. Ismatullayev P.R. et al. Metrology, standardization and certification. Textbook. Tashkent, 2001, -360b.

Additional literature:

1. Abduvaliev A.A. et al. "Fundamentals of standardization, metrology, certification and quality management" Tashkent, NIISPS, 2007.
2. Goncharov A.A., Kopylov V.D. Metrology, standardization and certification. The training manual. 2nd edition stereotype. Moscow: Publishing center "Academy", 2005.B.
3. B.Mukhammadiyev . A.Abdurakhmanov. Textbook on"Construction of measuring instruments " 2023.
4. A.Abdurakhmanov. Measurement uncertainty in science and technology textbook 2022.
5. Nazarov V.N., Karabegov M.A., Mammadov R.K. Fundamentals of metrology and technical regulation. Textbook. - St. Petersburg: St. Petersburg State University ITMO, 2008. – 110 P.
6. Dimov Yu. M. Metrology, standardization and certification: textbook. Publishing house "Peter", St. Petersburg, 2013. 496 P.
7. Ismatullayev P. R., Kadyrova SH. A., Umarova N. S. Methodological indication for the passage of practical training in the subject of Metrology, standardization and certification. DTO 2013.
8. Abduvaliev A. A., Latypov V. B., Umarov A. S. Alimov M. N., Khakimov O.SH., Hwang W. I. Standardization, Metrology, certification, quality. - Tashkent: SMSITI, 2008. Tutorial "fundamentals of Metrology".
9. Abduvaliev A. A., Latipov V. B., Umarov A. S. Alimov M. N., Khakmov O.SH., Shaozimov U. X. Metrology and standardization. - T.:
10. Shaozimov U. X. Metrology and standardization. - T."Science and technology", 2019. 204.

Internet sources:

1.http:\\www.gov.uz -Official website of the Government of the Republic of Uzbekistan.
2.http:\\www.lex.uz -National database of legislative acts of the Republic of Uzbekistan
3.http:\\www.standart.uz -Özstandart agency
4.http:\\www.smsiti.uz -Scientific Research Institute of Standardization, Metrology and certification
5. http:\\www.easc.org.by -Interstate Council for Standardization, Metrology and Certification of the Commonwealth of Independent States.
6.http:\\www.ziyonet.uz – Education portal
7.http:\\www.window.edu.ru – the whole Russian education portal