Fan name	Metrology and standardization . *4 ECTS*
Subject/module code	MS1404
Science teachable semesters	4th semester
Attached teacher	Rakhmonov Furqat Abduhakimovich, head teacher.
Education language	Uzbek
Science type	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 (topics)	**I. Home theoretical part (Lecture)** **Subject 1:** Introduction . Metrology and standardization science goal and tasks . Measurements unity provision system . **Subject 2:** Of greatness size . Metrology in the field used main terms

and definitions .

Subject 3: Metrological supply about concept . Metrological of supply goal and tasks .

Subject 4: Measurement of tools type confirm . Measure of tools metrological descriptions .

Subject 5: Measurement tools comparison . Measurement sectors .

Subject 6: Uzbekistan Republic of Standardization system . Standardization system goal and tasks ..

Subject 7: Uzbekistan To standardize in the Republic circle normative documents Categories and their designation . Stages of development of regulatory documents.

Subject 8: Standardization main regulations . Standardization about law essence .

Subject 9: Standards and measurement tools over state control . State metrological inspection and control application fields and objects .

Subject 10: Standard confirmation and state from the list transfer . Product create and working to release organization system .

Subject 11: Standardization advantage aspects of standards to oneself typical Features . Standardization system .

Subject 12: Standardization methods

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. Stangen tools with measurement their work to do .
2. Micrometric tools with measurement their work to do .
3. Ammeter and voltmeter from comparison transfer
4. Sound level meter device elements.
5. Ultrasonic thickness gauge for metal and plastic. (Leeb 332) device elements.
6. Elements of the ultrasonic flaw detector CTS-9008 PLUS device.

III. Practical for training instructions and recommendations

The teacher's preparation for a practical session begins with studying the initial 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 session, as well as the amount of work that each student must perform.

Methodological guidelines are the teacher's main methodological document in preparing and conducting practical classes.

The goal of practical training is to understand theory and acquire skills. Its conscious application in educational and professional activities consists in developing the ability to confidently formulate one's own point of view.

Recommended practical topics :

1. Metrology in the field used main terms and definitions essence .
2. Metrological of supply main purpose .
3. Calculation of conditions of open electrical networks
4. Standardization system about main information place .
5. Standards and measurement tools over state control importance .
6. Standards confirmation and state from the list transfer order .

IV. Independent study 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. Study the basic concepts and definitions of metrology. 2. Measurement types . 3. Studying standards, their types, development procedures, approval and registration procedures. 4. Study of standardization methods. 5. Study certification schemes. 6. Standardize and codify product information. 7. International organizations for metrology and standardization. 8. Metrology and metrological support 9. Modern measuring instruments and their descriptions 10. Estimating measurement uncertainty . 11. Ensuring the uniformity of measurements and standards . 12. Technical regulations and their development 13. The role and importance of standards in quality management 14. Certification and its legal and regulatory support . 15. Certification process in the release place .
Student assessment	Assessment of student knowledge is based on the mastery of teaching materials (tests, assignments, written and oral work results) during the semester and during the final examination. During the course, students are assessed on a 5-point system (electronic platform 100 points). The electronic platform is 100 points - 50 points are allocated for current control, independent learning and intermediate control (60% of 50 points are JN, MT and 40% ON), and 50 points are allocated for the final control result. Students whose total score of current and intermediate points is less than 30 points are not admitted to the final control exam. A student who scores 30 or more points in the final control is considered to have mastered the subject. Electronic platform " Metrology" and In the third semester of the subject " Standardization ", the current, independent study, intermediate and final control points are distributed as follows:
Exam requirements	The student must have fully mastered the theoretical and practical concepts of the subject, be able to correctly reflect the results of the analysis. The student must have completed the tasks given in the current and intermediate forms of independent work, assessment. At the same time, he must have received the necessary points from the current, intermediate, independent education and final tests in the relevant subject within the specified time. A student who has not submitted current control, intermediate control and independent education tasks, as well as who has scored less than 30 points on these tasks and types of control, will not be included in the final type of control. Also, a student who has missed 25 or more percent of the classroom hours allocated to the subject without an excuse will be expelled from this subject, will not be allowed to take the final exam and will be considered as not having mastered the relevant credits in this subject. A student who fails the final exam or scores less than 30 points on this type of exam is considered academically indebted.
Recommended Literature	**Main literature:** 1.Badalov.NJ . Metrology and standardization.Textbook.2023.303 pages. 2. Ismatullaev PR, Matyakubova PM, Turaev Sh.A. Metrology , standardization and Certification . Textbook . “ Lisson -press”, Tashkent, 2015. -423p. 3.Abduvaliev AA, Latipov VB, Umarov AS and Dr. Basic standardization, metrology, certification and quality control. - T.: NIISMS 2007. - 555 p.

4. Ismatullaev PR, Kodirova Sh.A. Metrology Basics . Study manual . Tashkent, “ Tafakkur ” publishing house 2012. -304 pages.
5. Kadyrova Sh.A. , Jabborov H.Sh. “ Metrology” and from the subject of " standardization " educational-methodical complex , T.:2020

Additional literature:

6. Mirziyoyev Sh.M. Erkin and prosperous , democratic Uzbekistan state together build we will . Uzbekistan Republic President's to the position to enter solemn to the ceremony dedicated High Assembly of the wards joint in the assembly speech . –T.: “ Uzbekistan ” NMIU, 2016. – 56 p.
7. Mirziyoyev Sh.M. Law priority and human interests provision – national development and people of well-being pledge . Uzbekistan Republic Constitution acceptance 24th anniversary of its creation dedicated solemn ceremonial lecture December 7 , 2016. – T.: “ Uzbekistan ” NMIU, 2016. – 48 p.
8. Mirziyoyev Sh.M. Buyuk our future brave and noble our people with together we will build . - T.: “ Uzbekistan ” NMIU, 2017. – 488 p.
9. Uzbekistan Republic further develop according to Actions strategy on . - T.: February 7 , 2017 , Decree No. PF-4947 .
10. Ismatullaev PR and etc. Metrology , standardization and Certification . Textbook . Tashkent , 2001, -360 p .
Abduvaliev A.A. i dr. "Basic standardization, metrology, certification and management of quality" Tashkent, NIISPS, 2007.
11. Ismatullaev PR, Kadirova SH.A., Umarova NS Methodological instructions for conducting practical training in metrology, standardization and certification. TDTU 2013.

Internet sources:

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2.http:\\www.lex.uz – Uzbekistan Republic law documents information national base
3.http:\\www.standart.uz – “ O'zstandart ” agency
4.http:\\www.smsiti.uz - Standardization , metrology and certification scientific research institute
5. http :// www . easc . org . by – Mezhgosudarstvennyy Sovet po standardizatsii, metrologii i certifikatsii Sodrujestva Nezavisimyx Gosudarstv.
6.http:\\www.ziyonet.uz – Education portal
7.http:\\www.window.edu.ru - Whole Russia education portal
Abduvaliev AA, Latipov VB, Umarov AS Alimov MN, Khakimov O.SH., Khvan VI Standardization , metrology , certification , quality . – Tashkent: SMSITI, 2008. " Metrology " Basics of Education " manual . Ismatillaev R. Kadirova SH. Tashkent 2021. Metrology , standardization and certification AAQurbonov training manual 2018. Ismatullaev PR , Kadirova Sh.A. “ Metrology , standardization and "certification " subject training manual .