

REPUBLIC OF UZBEKISTAN
MINISTRY OF HIGHER EDUCATION, SCIENCE AND INNOVATIONS
FERGANA STATE TECHNICAL UNIVERSITY

Metrology, Standardization, and Product Quality Management
MODULE HANDBOOK

Field of knowledge:	700000	- Engineering, Manufacturing, and Construction
Field of Education:	730 000	- Architecture and Construction
Educational Program:	60730300	- Civil Engineering

Module title	<i>Metrology, Standardization, and Product Quality Management</i>
Code (if available)	<i>MS and PQMM44</i>
Semester(s) of module teaching	<i>4</i>
Responsible for the module	<i>Xasanov Ibrohimjon Yaxyojon ogli, assistant teacher in the department of Metrology, Standardization, and Product Quality Management</i>
Language of instruction	<i>Uzbek, English</i>
Connection to the curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, practical training, laboratory training, independent study.</i>
Study load (including classroom and independent study hours)	<i>Total hours: 120 hours Auditorium hours: 48 hours lecture – 30 hours, practical training – 12 hours, Laboratory Training-6 hours, independent training-72 hours.</i>
Credit units	4
Required and recommended prior knowledge for studying the module	<i>Physics, Higher mathematics</i>
Module objectives/intended learning outcomes	Module Objective: <i>To provide students with fundamental concepts of standardization, metrology, certification, and quality management related to production, trade, control, and consumption in the fields of engineering technology, construction, management, and marketing in the national economy. Additionally, to teach the metrological characteristics of measuring instruments used in engineering communications for technical structures and systems, and to develop skills for applying technical regulation requirements and international standards in building and construction practices.</i> <i>To achieve the above goal, the course aims to equip students with theoretical knowledge, practical skills, and a methodological approach to assessing the performance of technical measuring tools used in the construction of buildings and structures, as well as to develop their scientific worldview.</i> The following knowledge, skills, and competencies are required of students in this subject. The student must: <i>• have an understanding of ensuring measurement uniformity, the structure and normative base of the State System, the rules and structure of the National Standardization System, as well as the categories and types of standards;</i> <i>• know the activities and regulations of international metrology organizations, the measurement process and objects, quantities, their qualitative and quantitative characteristics, units of measurement, technical measuring instruments, the National Standardization System of Uzbekistan, the legal foundations of standardization, the creation and classification of standards, technical regulation, development of technical regulations, and the provision of safety indicators, and be able to apply them;</i> <i>• be able to apply the international system of units, methods of performing measurements, classification and elimination of measurement errors and their types, guiding documents, instructions, coding, methods of unification, and aggregation.</i>
Themes of the lecture lessons	Lecture 1. <i>Introduction to the subject “Metrology, Standardization and Product Quality Management.” Subject matter and methods. Essence and</i>

	historical development of the subject. Emergence of the field of industrial measurements. Lecture 2. Metrological support and metrological service. International practices in the field of metrology. Issues of metrological support in enterprises, production processes, and industry. International metrology organizations. Basic terms and definitions in metrology. Lecture 3. Quantities and units of measurement. Quantities and their types. The metric system and its origin. Prospects for the development of the International System of Units. Lecture 4. General information about the measurement process. Measurement process, object and subject of measurement. Methods and types of measurement. Lecture 5. Measuring instruments and their types. Classification of measuring instruments. Principles of operation of measuring instruments. Lecture 6. Quality criteria of measurements and metrological characteristics of measuring instruments. Quality criteria in the measurement process. Measurement errors and their types. Metrological characteristics of measuring instruments. Lecture 7. Standardization activities. Goals and objectives of standardization. The Law of the Republic of Uzbekistan "On Standardization." Basic terms and definitions in standardization. Lecture 8. State standardization system of the Republic of Uzbekistan. State control over standardization. Categories of normative documents and types of standards in our country. Organization of standardization work in the Republic. Lecture 9. Development, approval, and implementation of standards. Procedures for the development, approval, and registration of state standards. Interested organizations participating in the process. Lecture 10. International standards. LEED, ISO, and EN/CEN/CENELEC series of standards. Lecture 11. System of product design, creation, and development. Product life cycle. System for organizing product creation and production. Harmonization of normative documents with international standards. Lecture 12. Certification of products and services. Certification process. The role of certification in product marketing. Organization of certification activities. Stages and procedures of the certification process. Lecture 13. Quality of products and services. Quality indicators. Quality and quality management. Product competitiveness. Lecture 14. Principles of quality management system based on the ISO 9001 international standard. Implementation of ISO 9001 standard in enterprises and organizations. Principles of the quality management system. Lecture 15. Product quality control. Testing of construction materials and processes.
Themes of practical training	Study of basic terms and definitions in the subject "Metrology, Standardization and Product Quality Management." Metrological inspection and control of measuring instruments used in the construction sector. Standardization of construction products. Study of modern measuring devices used in construction (Defect detectors and contactless measuring instruments).
Themes of laboratory exercises	Detection of errors in measuring instruments. Determination of standards for quality indicators of construction items. Detection of errors in angular measuring instruments, and horizontal and vertical precision measuring devices.

Forms of assessment	<i>oral, presentation, written work, practical assignments, laboratory work, and final exams.</i>
Requirements for study and assessment	<i>To successfully complete the module, the student must attend classes and achieve the minimum required scores in the current, midterm, and final assessments.</i>
Bibliography	1. <i>Constantin Codreanu. "Basics of Metrology, Standardization and Electrical Measurements" tutorial. Chisinau, 2021 – 376 p.</i> 2. <i>A.S. Askarova. "Metrology, Standardization and Certification in the Energy Sector: Manual for Graduate Students" tutorial. Almaty, 2019 – 129 p.</i> 3. <i>R.T. Tojiyev et al. "Metrology, Standardization and Certification in Construction" textbook. Tashkent, 2022 – 464 p.</i> 4. <i>Christian Brecher. "Machine Tools Production Systems 2: Design, Calculation and Metrological Assessment (1–2)" guide. Germany, 2021 – 840 p.</i> 5. <i>P. Ismatullayev. "Fundamentals of Metrology". Tashkent, 2020 – 292 p.</i>
Reviewers	Yu. Mamasodiqov – Associate Professor (DSc), Department of Electronics and Instrumentation, Fergana State Technical University. D. Hamidov – Chief Specialist, Fergana Branch of the National Metrology Institute of Uzbekistan.