



Syllabus of the educational component

Program of educational discipline

Certification and metrological quality assurance

Specialty

131 – Applied mechanics

Educational program

Applied mechanics.

Level of education

Master's degree

Semester

2

Institute

NNI of Mechanical Engineering and Transport

Department

Foundry production (142)

Course type

Special (professional), mandatory

Language of instruction

Ukrainian, English

Lecturers and course developers



Oleg Viktorovych Akimov

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Doctor of technical sciences, professor, head of the department of foundry production of NTU "KhPI"

Work experience - 37 years. Author and co-author of more than 200 scientific and methodical publications. Courses: "Certification and metrological quality assurance", "Modern technologies in applied mechanics" and others.

[Learn more about the teacher on the department's website](#)

General information

Summary

The course "Certification and metrological quality assurance" develops knowledge about a set of interrelated rules and methods that allow developing and implementing quality assessment rules and procedures, as well as harmonizing them in international quality management and certification systems.

Course objectives and goals

Develop the student's ability to control the quality of products; develop proposals for improving the quality of products in order to expand the sales market; ability to organize work on marketing of foundry products

Format of classes

Lectures, practical classes, independent work, consultations. Calculation task. Final control - exam.

Competencies

GC4. Ability to generate new ideas (creativity).

GC6. Ability to communicate with representatives of other professional groups at different levels (with experts from other fields of knowledge/types of economic activity).

FC4. The ability to critically analyze problems in education, professional and research activities at the level of the latest achievements of engineering sciences and at the boundaries of subject areas.

FC5. The ability to set a problem and determine ways to solve a problem by means of applied mechanics and related subject areas, knowledge of methods of finding the optimal solution under conditions of incomplete information and conflicting requirements.

FC7. Ability to describe, classify and model a wide range of technical objects and processes, based on deep knowledge and understanding of mechanical theories and practices, as well as basic knowledge of related sciences.

FC8. The ability to generate new ideas and the ability to substantiate new innovative projects and promote them on the market.

FC9. The ability to work independently and effectively function as a group or structural unit leader when performing production tasks, complex projects, and scientific research. Responsibility for the development of professional knowledge and practices, assessment of the team's strategic development

Learning outcomes

LR1. Apply specialized conceptual knowledge of the latest methods and techniques of design, analysis and research of structures, machines and/or processes in the field of mechanical engineering and related fields of knowledge.

LR 2. Develop and put into production new types of products, in particular, perform research and design work and/or develop technological support for the process of their production.

LR 4. Use modern methods of optimizing the parameters of technical systems by means of system analysis, mathematical and computer modeling, in particular under the conditions of incomplete and contradictory information.

LR 5. Independently set and solve problems of an innovative nature, argue and defend the obtained results and decisions.

LR 6. Develop, implement and evaluate innovative projects taking into account engineering, legal, environmental, economic and social aspects.

LR 11 Develop management and/or technological solutions under uncertain conditions and requirements, evaluate and compare alternatives, analyze risks, forecast possible consequences.

LR 14. Demonstrate knowledge of the basics of organization and personnel management.

Student workload

The total volume of the discipline is 120 hours. (4 ECTS credits): lectures – 32 hours, practical classes – 16 hours, independent work – 72 hours.

Course prerequisites

To successfully complete the course, you must have knowledge and practical skills from the following discipline: "Working processes of modern productions", "Resource-saving technologies and melting of special alloys. properties»

Features of the course, teaching and learning methods, and technologies

Lectures are conducted interactively using multimedia technologies. On practical ones classes use a project approach to learning, game methods, focus on application of information technologies in the certification of foundry production. Study materials are available to students through OneNote Class Notebook..

Program of the course

Topics of lectures

Topic 1. Philosophy and history of quality management.

Basic concepts of quality management. Compilation of a terminological dictionary on quality management

Topic 2. Quality of castings. Methodological foundations of quality management.

Qualimetry as a science. Assessment of the level of quality of castings. Purpose, functions and tasks of quality management Compilation of a classifier of approaches to quality management. Designing a system of casting quality indicators

Topic 3. Disciplinary methods of quality management

Organizational and organizational-technological methods of quality management.

Topic 4. Expert methods of quality management

Basic concepts of expert systems.

Topic 5. Statistical methods and tools of quality management of foundry products.

Analysis of the causes of the problem (flaw) using Ishikawa cause and effect diagrams

Topic 6. Quality management systems.

Principles of Total Quality Management (TQM)

Topic 7. Normative and documentation support of quality management.

Standardization as the basis of regulation in quality management Legal mechanisms of quality management. Working with the text of the DSTU standard ISO 9000:2017 Quality management systems

Topic 8. Cybernetic models in casting quality management

The method of operational - technological management of the quality of castings using neural networks

Topics of the workshops

Topic 1. Statistical methods of quality management of foundry products.

Topic 2. Quality management tools of foundry products.

Topic 3. Normative and documentation support of quality management.

Topic 4. ISO 9000 international quality standards.

Topic 5. Assessment of the quality level of castings.

Topic 6. Principles of total quality management (TQM).

Topics of laboratory work

Laboratory work within the discipline is not provided.

Self-study

The course involves writing an essay on international certification systems. The result is drawn up in a written report. Students are also recommended additional materials for independent study and analysis.

Course materials and recommended reading

Basic literature

1. Bozhenko, L.I. Standardization, metrology and quality measurement in mechanical engineering: training. guide /ed. L.I. Kryuchkevich - Lviv: Svit, 2003
2. Bychkivskiy, R.V., Stolyarchuk, P.G., Gamula, P.R. Metrology, standardization, quality management and certification: textbook /ed. R.V. Bychkivskiy - Lviv: Lviv Polytechnic, 2002
3. Kyrychenko, L.S. Merezhko, N.V. Basics of standardization, metrology and quality management: teaching. manual -- Kyiv: KNTEU, 2001
4. Loiko, D. P. Quality management. Lviv: Magnolia, 2010
5. Sarancha, G.A., Yakymchuk, G.K. Metrology, standardization and quality management: a textbook. - Kyiv: Osnova, 2004
6. Tarasova, V.V., Malinovsky, A.S., Rybak, M.F. Metrology, standardization and certification: textbook - K.: Training Center. summer, 2006
7. Topolnyk, V.G., Kotlyar, M.A. Metrology, standardization, certification and quality management: teaching. manual - Lviv: Magnolia 2006, 2012
8. Tsiucsyura, S.V. , Tsiucsyura V.D. Metrology, basics of measurements, standardization and certification: teaching. manual. - 3rd type. - K.: Znannia, 2006

Additional literature

9. Geshelyn, V. G. Certification and quality of metal products. - Kh.: Fakt, 2004. - 480 p
10. Kyrychenko, L. S. Standardization and certification of goods and services. - Kh.: Ranok, 2008, - 240
11. Konstantinova L. V., Klymenko G. V. Analysis of requirements of international standards ISO 9000 series X.: NTU "Khpy", 2007
12. Sarancha, G. A and others. Metrology, standardization, compliance, accreditation and quality management. K.: Education Center. letters, 2006.

14. Cherenkov S. T. Technical regulation and confirmation of compliance in Ukraine. NTU "KhPI", 2010
 15. Standard DSTU ISO 9000:2017. Quality management systems. Basic provisions and glossary of terms.

Assessment and grading

Criteria for assessment of student performance, and the final score structure

100% of the final grade consists of assessment results in the form of credit (40%) and current assessment (60%).

Test: written task (2 questions from theories) and an oral report.

Current assessment: 2 modular control and calculation task (20% each).

Grading scale

Total points	National	ECTS
90–100	Excellent	A
82–89	Good	B
75–81	Good	C
64–74	Satisfactory	D
60–63	Satisfactory	E
35–59	Unsatisfactory (requires additional learning)	FX
1–34	Unsatisfactory (requires repetition of the course)	F

Norms of academic integrity and course policy

The student must adhere to the Code of Ethics of Academic Relations and Integrity of NTU "KhPI": show discipline, education, benevolence, honesty, responsibility. Conflict situations should be openly discussed in study groups with the teacher, and if it is impossible to resolve the conflict, it should be brought to the attention of the employees of the institute's directorate.

Regulatory and legal support for the implementation of the principles of academic integrity of NTU "KhPI" is posted on the website: <http://blogs.kpi.kharkov.ua/v2/nv/akademichna-dobrochesnist/>

Approval

Approved by

22.08.2023

Date, signature

Head of the department
Oleg AKIMOV

22.08.2023

Date, signature

Guarantor of the educational
program
Oleksandr SHELKOVY