Ministry of education and science of Ukraine
National Aerospace University
«Kharkiv Aviation Institute»

Department of intellectual measuring systems and quality engineering (№ 303)

ACCEPTED

Head of the project group/
Head of the educational and review commission

(signature) D. Kritskiy (name)

«____» _____ 2021 p.

WORKING PROGRAM OF THE SELECTIVE EDUCATIONAL DISCIPLINE

Rules of technical regulation in European Union
(name of the educational discipline)

Field of knowledge: 10 Natural sciences, 11 Mathematics and statistics, 12 Information Technologies, 15 Automation and instrument engineering, 16 Chemical and bioengineering, 17 Electronics and telecommunications, 19 Architecture and building.

Specialty: 101 Ecology, 103 Earth sciences, 113 Applied mathematics, 121 Software engineering, 122 Computer Sciences, 123 Computer Engineering, 124 System analysis, 125 Cybersecurity, 151 Automation and Computer-Integrated Engineering, 152 Metrology and Information and Measurement Technology, 163 Biomedical Engineering, 172 Telecommunications and Radioengineering, 173 Avionics, 193 Geodesy and land management.

Educational program: all educational programs for corresponding specialties

Level of higher education:
second (master)

Working program is put in place since 01.09.2021 year

Kharkiv 2021 year

Developer: Zabolotnyi O., doctor of engineering sciences, assoc. prof.
(name and affiliations) (signature)

Educational program was accepted on the session of the Department of intellectual measuring systems and quality engineering
(name of the department)

Protocol № 1 from « 27 » 08 2021 p.

Head of the department, cand. of eng. sciences, assoc. prof. V. Siroklyn
(affiliations) (signature) (name)

1. Description of the discipline

<table>
<tr><td>Name of the factor</td><td>Field of knowledge, specialty, educational program, level of higher education</td><td>Characteristics of the discipline
(face-to-face form of studies)</td></tr>
<tr><td>Number of credits – 5,0</td><td rowspan="11">Field of knowledge
15 Automation and instrumentation
(code and name)

Specialty
152 Metrology and information-measuring technique,
(code and name)

Educational program
«Quality, standardization and certification»
(name)

Level of higher education:

second (master)</td><td>Selective</td></tr>
<tr><td>Number of modules – 2</td><td>Year of education</td></tr>
<tr><td>Number of substantive modules – 3</td><td>2021/2022</td></tr>
<tr><td>Individual task
_____
(name)</td><td>Semester</td></tr>
<tr><td rowspan="2">Total number of hours – 150
Number of hours for classroom studies[1)]/ total number of hours 64/150</td><td>1-st</td></tr>
<tr><td>Lections*</td></tr>
<tr><td rowspan="7">Number of week hours for classroom studies:
classroom – 3
independent – 4</td><td>32 hours</td></tr>
<tr><td>Practical training*</td></tr>
<tr><td>32 hours</td></tr>
<tr><td>Laboratorial works*</td></tr>
<tr><td>__ hours</td></tr>
<tr><td>Independent work</td></tr>
<tr><td>86 hours</td></tr>
<tr><td>Type of control</td></tr>
<tr><td>Modular control, exam.</td></tr>
</table>

Relation of classroom studies to independent work in hours: *64/ 86*.

* Classroom load can be reduced or increased into one hour following the classes schedule.

2. Aim and task of the discipline

Aim of studying: studying the basic principles of the EU and Ukrainian systems of total quality management.

Task: understand the main directions of modification for the field of technical regulation in Ukraine; structure and activity of the Ukrainian accreditation system for the conformity assessment bodies; questions of certification for quality management systems, environmental management systems, systems of food safety management, metrological assurance of certification testing and statistical methods of quality management.

Competences, that are going to be obtained.

- ability to communicate with representatives of other professional groups of different levels (with experts of other fields of knowledge / fields of economic activity, auditors of certification bodies);
- capability to analyze, verify, estimate the completeness of information during the process of professional activity, add and synthesize information which is absent when necessary work in the conditions of uncertainty.
- capability to provide professional, including scientific and research activity, in international medium;
- capability to demonstrate knowledge and understanding of scientific facts, concepts, theories, principles and methods, necessary to support specializations in technical regulation;
- capability to develop methodical and normative documents, related to testing, calibrating, verification and conformity assessment of different measuring instruments, choosing dedicated equipment etc.;
- capability to develop the programs of metrological assurance for technological processes and instrumentation for different stages of their lifecycle.

Expected results of studying:

- knowledge and understanding of basic metrological concepts, measurement theory, mathematical and computer modeling, modern methods of experimental results processing and measurement accuracy estimation, standardization and conformity assessment on the level, necessary to achieve other educational program results, including certain knowledge of the latest achievements;
- know common concepts, terms and definitions in the field of quality, methods of product quality estimation, types of tests and test procedures and their general characteristics;
- know functions and structures, metrological models of information-measuring systems, which are applied in metrological support of testing and products quality,

algorithms of estimating the errors of measuring information digital processing, basic normalization principles and methods of metrological characteristics experimental definition, organizational and normative fundamentals of metrological support.

Prerequisites – *introduction into specialty, metrology and measurement theory, higher mathematics, physics, electronic and technical materials, measuring transducers, fundamentals of means of measurement construction, technology of means of measurements production, qualimetry, means of measurement, interchangeability, methods and means of measurement for physical parameters.*

Corequisites – *metrological support of testing and products quality, metrological support of certification, quality management of products and services.*

3. Content of the discipline

Module 1.

Substantive module 1. *European approach to technical regulation.*

Topic 1. *EU Directives.*
Topic 2. *Concepts of «new» and «global» approaches.*
Topic 3. *Modules of conformity assessment to EU directives.*
Topic 4. *Notification of conformity assessment bodies.*
Topic 5. *Principles of marking with CЄ sign.*
Topic 6. *Principles of market surveillance in EU.*
Topic 7. *Regulatory and legal acts of technical regulation in Ukraine.*
Modular assessment.

Module 2.

Substantive module 2. *General estimation of the state in the field of technical regulation in Ukraine.*

Topic 1. *Analysis in the field of standardization.*
Topic 2. *Conformity assessment.*
Topic 3. *Metrology.*
Topic 4. *Product quality management.*
Topic 5. *Consumer rights protection.*
Modular assessment.

Substantive module 3. *Statistical methods in quality management.*

Topic 1. *Methods of statistical analysis.*
Topic 2. *Statistical acceptance control.*

Topic 3. *Control paper.*
Topic 4. *Control card.*
Topic 5. *Stratification.*
Topic 6. *Pareto diagram.*
Topic 7. *Correlation analysis.*
Topic 8. *Histogram.*
Topic 9. *Isikava diagram.*
Topic 10. *Estimation of accuracy for technological processes*.
Topic 11. *«Six sigma» concept.*
Modular assessment.

4. Structure of the discipline

Name of modules and topics	Number of hours				
	Total	Including			
		Lec.	Pract.	Lab.	Ind.
1	2	3	4	5	6
Module 1					
Substantive module 1. *European approach to technical regulation.*					
Topic 1. *EU Directives.*	8	1	1		6
Topic 2. *Concepts of «new» and «global» approaches.*	10	2	2		6
Topic 3. *Modules of conformity assessment to EU directives.*	4	2	2		
Topic 4. *Notification of conformity assessment bodies.*	4	2	2		
Topic 5. *Principles of marking with CЄ sign.*	2	1	1		
Topic 6. *Principles of market surveillance in EU.*	4	2	2		
Topic 7. *Regulatory and legal acts of technical regulation in Ukraine.*	4	2	2		
Modular assessment	2				2
Total for substantive module 1	38	12	12		14
Hours in total	38	12	12		14
Module 2					
Substantive module 2. *General estimation of the state in the field of technical regulation in Ukraine.*					
Topic 1. *Analysis in the field of standardization.*	3	1	2		
Topic 2. *Conformity assessment.*	1	1			
Topic 3. *Metrology.*	3	1	2		
Topic 4. *Product quality management.*	3	1	2		
Topic 5. *Consumer rights protection.*	1	1			
Modular assessment	2				2
Total for substantive module 2	13	5	6		2
Substantive module 3. *Statistical methods in quality management.*					
Topic 1. *Methods of statistical analysis.*	8	2			6
Topic 2. *Statistical acceptance control.*	7	1	2		4
Topic 3. *Control paper.*	11	1	2		8
Topic 4. *Control card.*	11	1	2		8
Topic 5. *Stratification.*	5	1			4
Topic 6. *Pareto diagram.*	12	2	2		8
Topic 7. *Correlation analysis.*	5	1			4
Topic 8. *Histogram.*	11	1	2		8

Topic 9. *Isikava diagram.*	11	1	2		8
Topic 10. *Estimation of accuracy for technological processes.*	12	2			10
Topic 11. *«Six sigma» concept.*	4	2	2		
Modular assessment	2				2
Total for substantive module 3	99	15	14		70
Exam	2				
Total hours	114	20	20		72
Total for the discipline	150	32	32		86

5. Topics for practices

№ p/p	Name of the topic	Number of hours
1	EU Directives.	1
2	Concepts of «new» and «global» approaches.	2
3	Modules of conformity assessment to EU directives.	2
4	Notification of conformity assessment bodies.	2
5	Principles of marking with CЄ sign.	1
6	Principles of market surveillance in EU.	2
7	Regulatory and legal acts of technical regulation in Ukraine.	2
8	Analysis in the field of standardization.	2
9	Metrology.	2
10	Product quality management.	2
11	Statistical acceptance control.	2
12	Control paper.	2
13	Control card.	2
14	Pareto diagram.	2
15	Histogram.	2
16	Isikava diagram.	2
17	«Six sigma» concept.	2
	In total	32

6. Individual work

№ p/p	Name of the topic	Number of hours
1	Training on the text of «new» approach directives.	6
2	Directives of «new» and «global» approaches.	8
3	Methods of statistical analysis	8
4	Statistical acceptance control	4
5	Control paper.	8
6	Control card.	8
7	Stratification	4
8	Pareto diagram.	8
9	Correlation analysis	4
10	Histogram	8
11	Isikava diagram.	10
12	Estimation of accuracy for technological processes.	10
	In total	86

7. Methods of learning

Giving classroom lections, practices, laboratory works, trainings in accordance with a schedule of a department and individual (when necessary), student's individual work with materials, presented by the department (methodical recommendations).

8. Methods of control

Providing current checks, written modular checks, final check in a form of pass, exam, differential pass.

9. Grading criterions and distribution of points, received by students

9.1. Distribution of points, received by students (numerical criterions of grading)

Components of the educational process	Points for one class (task)	Number of classes (tasks)	Total number of points
Substantive module 1			
Work during lections	0…1	7	0…7
Performance and protection of laboratorial (practical) tasks	0...2	7	0...14
Modular assessment	0…10	1	0…10
Substantive module 2			
Work during lections	0…1	5	0…5
Performance and protection of laboratorial (practical) tasks	0...5	3	0...15
Modular assessment	0…12	1	0…12
Substantive module 3			
Work during lections	0…1	11	0…11
Performance and protection of laboratorial (practical) tasks	0...2	7	0…14
Modular assessment	0…12	1	0…12
In total for the semester			**0…100**

Semester final check (exam) should be held when the student has disagreed with the points of current checks and when the student has a permission to pass the exam. During the examination process student has a possibility to get maximal 100 points.

Task for the exam consists of *two theoretical questions (maximal number of points is 30 per each question) and one practical task (maximal number of points is 40).*

9.2. Qualitative criterions of grading

Necessary skills to get positive mark:

Concepts of «new» and «global» approaches in technical regulation; content of the modules of conformity assessment; principles of marking with CЄ sign; principles of transformation the sphere of technical regulation in Ukraine; general estimation of the state in the field of technical regulation in Ukraine; statistical methods in quality control, «Six sigma» concept.

9.3 Criterions of grading the student's work during the semester

Satisfactory (60-74). Demonstrate minimal knowledge and skills. Protect all individual tasks and pass all tests. Fulfill and protect all laboratorial works. Be able to give independent assessing the status of the fundamentals of measurement theory, know the aspects calculating the result of multiple measurements, understand the instruments of products and services quality control. Know the principles of 'Six sigma' method.

Good (75-89). Demonstrate good knowledge of the discipline, fulfill all tasks. Demonstrate skills in performance and protection all labs in a term, defined by the teacher with justification of all decisions and efforts, applied in laboratorial works. Be capable to explain the ways of solving practical tasks, connection between practical and theoretical materials. Be able to use complementary sources of information.

Excellent (90-100). Pass all checkpoints with excellent mark. Know all topics in details and be able to implement this knowledge in practice.

Grading scale: in points and traditional

Sum of points	Traditional mark	
	Exam, differential pass	Pass
90 – 100	Excellent	Passed
75 – 89	Good	
60 – 74	Satisfactory	
0 – 59	Not satisfactory	Not passed

10. Methodical literature

1. Основи стандартизації: підручник / О.В. Заболотний, М.Д. Кошовий, В.О. Книш та ін. – Х.: Нац. аерокосм. ун-т «Харк. авіац. ін-т», 2010. – 302 с
2. Статистичні методи управління якістю [Текст] : навч. посіб. / Т.В. Чебикіна, Г. Г. Бондаренко, Н. В. Чернобай, В. П. Сіроклин. – Харків. : Нац. аерокосм. ун-т ім. М. Є. Жуковського «Харків. авіац. ін-т», 2017. – 40 с.

11. Recommended literature

Basic

1. Directive 2002/98/EC of the European Parliament and of the Council 27 January 2003.
2. de Vries, Henk J. & Feilzer, Albert & Gundlach, Harry & Simons, Jan. (2010). Conformity Assessment.
3. https://www.trade.gov/country-commercial-guides/eu-eu-legislation-and-ce-marking.

4. https://www.privacyshield.gov/article?id=European-Union-Trade-Standards.
5. Neyestani, B. (2017). Seven Basic Tools of Quality Control: The Appropriate Techniques for Solving Quality Problems in the Organizations. https://doi.org/10.5281/zenodo.400832.
6. http://profsite.um.ac.ir/~ahad/QualityTools.pdf.
7. https://mpra.ub.uni-muenchen.de/77941/1/MPRA_paper_77941.pdf.