



***Современные инновационные высокотехнологичные
производственные процессы / Modern innovative high-tech
production processes***

Syllabus of the course

Specialty	38.04.02 Management
Specialization	Risk management and controlling
Level of higher education	Master's Degree
Form of training	Full-time
Year of enrolment	2022
Authored by:	
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Total number of hours	108	Form of final attestation: Test: semester 3
incl:		
contact work	28	
self-study	80	
practical training	0	
control hours	0	

Hours distribution:

Semester:	3
Type of classes	Hours
Contact hours	2
Practical training	
Laboratory work	
Total contact hours	28
Self-study	80
Control hours	0
Total academic hours	108
Total credits	3

CONTENTS

1. LEARNING OBJECTIVES	3
2. COURSE PLACE IN THE PROGRAMME STRUCTURE.....	3
3. EXPECTED LEARNING OUTCOMES	3
4. COURSE STRUCTURE AND CONTENT	3
5. TEACHING AND LEARNING TOOLS OF THE COURSE.....	5
5.1 Recommended literature	5
5.2 List of software (including national production).....	5
5.3 List of reference systems and modern professional databases	5
6. TECHNICAL FACILITIES.....	6
7. METHODOLOGICAL GUIDELINES FOR STUDENTS	6
8. SPECIFICATIONS FOR TEACHING DISABLED PERSONS	7
1.1 Control tasks and assignments for interim attestation	9
1.2 Topics for written task	9
1.3 Interim checkpoints.....	9
1.4 Other assessment objects	9
1.5 Self-study	9
1.6 Grading scale	9

1. LEARNING OBJECTIVES

Objective:	To provide students with a set of theoretical knowledge and practical skills in the technology and organisation of products and services.
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2. COURSE PLACE IN THE PROGRAMME STRUCTURE

The discipline FTD.DV Modern Innovative High-Tech Production Processes is an elective course and is optional in the curriculum.

3. EXPECTED LEARNING OUTCOMES

Code and name of graduate competence	Code and name of the competence achievement indicator	Expected learning outcomes
UC-1 – Is able to critically analyse problematic situations with a systematic approach, to develop a strategy of action.	UC-1.3 – Identifies and assesses the practical implications of possible solutions to the problem, develops and proposes different strategic solutions to the problem, assessing their advantages and disadvantages.	<p>To know: Theory on basic methods for analysing, synthesising and optimising the quality assurance processes of modern technological systems.</p> <p>To be able: Compare methods for analysing, synthesising and optimising the quality assurance processes of modern technological systems.</p> <p>To possess: Compare methods for analysing, synthesising and optimising the quality assurance processes of modern technological systems.</p>

4. COURSE STRUCTURE AND CONTENT

Code and name of the topics	Course content	Academic hours			
		Contact work			Self-study
		Lectures	Practices	Workshops	
Topic 1. The physical and chemical basis of machining processes.	Cutting as a technological method of machining that differs from other methods of processing materials by the formation of chips, its essence and elements of machining. Vibrations during material cutting. Changing the qualitative characteristics of the surface during machining. Surface roughness. Parameters for standardising surface roughness. Effect of machining parameters on the height of micro-irregularities. Clave	1			26

	in the surface layer of the material during cutting. Residual stresses in the surface layer of material during cutting. Selection of optimum cutting conditions for blade cutting. Input data for calculating cutting conditions. Selection of cutting tool material. Selection of geometrical parameters of turning turning feed cutters. Selection of cutting conditions.				
Topic 2. Physical basis of technological processes for the electrical discharge machining of workpieces.	General information on electrical discharge machining: electric spark and electric pulse. Description of the electrical discharge machining process. Basic schemes of electrical discharge machining and equipment. Technological parameters of electrical discharge machining	1			10
Topic 3. Physical basis of technological processes for electrosark alloying of workpieces.	Description of the process of electrosark alloying of workpieces. Fields of application of electrosark alloying of workpieces.				10
Topic 4. Physical basis of electrical contact machining processes.	A description of the electrocontact machining of workpieces. Fields of application of electric contact machining.				10
Topic 5. The physical basis of plasma process technology for the machining of workpieces.	General information on plasma treatment. Generation of plasma for technological purposes. Characteristics of the plasma source. Plasma heating. Melting of matter with plasma. Plasma welding and surfacing Plasma spraying Plasma cutting.				10
Topic 6. Physical basics of electron-beam processing of workpieces.	General information on the electron-beam treatment of workpieces. Electron-beam treatment installations. Electron-beam interaction with matter. Application of electron-beam treatment. Floating. Evaporation. Heat treatment.				10
Topic 7. Physical basis of the technological process of light-beam treatment of workpieces.	General information on light-beam treatment. Basic circuits of UCG. Solid state lasers. Gas lasers. Laser treatment applications. Heating with OKG radiation. Melting with OKG radiation. Cutting and machining.				10
Topic 8. Physical basis of technological processes for the electrochemical treatment of workpieces.	General information on electrochemical treatment. Basic regularities of anodic dissolution of metals. Classification of electrochemical treatment methods. Technological indicators of electrochemical treatment.				10
Topic 9. Type of treatment based on pulsed ultrasonic	General information on ultrasonic vibrations. Basic understanding of ultrasound. Classification of the main types of ultrasonic machining (USM).				10

mechanical action on the material to be treated.	Ultrasonic dimensional machining. Ultrasonic welding. Ultrasonic soldering. Ultrasonic cleaning.				
Control hours:					0
Total hours:		2	0	0	106

5. TEACHING AND LEARNING TOOLS OF THE COURSE

5.1 Recommended literature

Bibliographic description of the publication (author, title, type, place and year of publication, number of pages)	Digital resources
Belova T.A., Danilin V.N. Technology and organization of production and services. Textbook / Belova T.A., Danilin V.N. Electronic data.Moscow : Knorus, 2019 237 p.	https://book.ru/books/930601
Cherepakhin Alexander Alexandrovich Technology of structural materials. Welding Production : textbook for high schools / A.A. Cherepakhin, V.M. Vinogradov, N.F. Shpunkin.2nd ed. amended and supplemented Electronic data.Moscow : Yurite, 2022 269 p (Higher Education)	https://urait.ru/bcode/490790
Rogov, Vladimir Aleksandrovich Mechanical Engineering Materials and Blanks : textbook for higher education / V.A. Rogov, G.G. Poznyak.3rd ed. amended and supplemented Electronic Data.Moscow : Yurite, 2022337 p (Higher Education)	https://urait.ru/bcode/490805

5.2 List of software (including national production)

- 7-Zip
- Microsoft Office Professional
- Microsoft Windows Professional

5.3 List of reference systems and modern professional databases

№	Name of reference systems and professional databases
1.	Digital library Grebennikon.ru – www.grebennikon.ru
2.	Science Digital Library eLIBRARY – www.elibrary.ru
3.	Science Digital Library КиберЛенинка – www.cyberleninka.ru
4.	Database ПОЛПРЕД Справочники – www.polpred.com
5.	Database OECD Books, Papers & Statistics on the platform OECD iLibrary www.oecd-ilibrary.org
6.	Legal reference system КонсультантПлюс (installed resource UNECON or www.consultant.ru)

7.	Legal reference system «ГАРАНТ» (installed resource UNECON or www.garant.ru)
8.	Information and referral system «Кодекс» (installed resource UNECON or www.kodeks.ru)
9.	Digital library system BOOK.ru - www.book.ru
10.	Digital library system ЭБС ЮРАЙТ – www.urait.ru
11.	Digital library system ЗНАНИУМ (ZNANIUM) – www.znanium.com
12.	Digital library UNECON – opac.unecon.ru

6. TECHNICAL FACILITIES

There are special rooms for lectures, seminars, coursework, group and individual consultations, current and interim assessments, as well as rooms for self-study.

The premises are equipped with equipment and teaching aids.

The rooms for students' independent work are equipped with computers with Internet connection and access to the university's electronic learning environment.

Name of classroom	Classroom location
Classroom 3-4-5 Training classroom (for lecture- and seminar-type classes, coursework, group and individual consultations, current control and intermediate attestation), equipped with a multimedia system. Specialized furniture and equipment: Educational furniture for 36 seats, a teacher's workplace, a chalk board 1 pc, a pedestal m/m-Computer Gigabyte H77M-D3H, Intel Core i5-3570 3.4GHz/4Gb /500Gb/ View Sonic VA703b) - 1 pc, Optoma x 400 multimedia projector - 1 pc, Sound kit (mixer-amplifier Apart Concept + BEHRINGER microphone) - 1 pc, Projection screen. Projecta Compact Electrol 153x200 cm MATTE White S - 1 pc., Hi-Fi PRO MASK6T-W (2 units) - 1 pc. List of licensed software. Sets of display equipment and visual aids: multimedia applications for lecture courses and practical sessions, interactive teaching and visual aids.	191023, St. Petersburg, Griboedova canal, 30-32, lit. A, B, P
Classroom 3-4-7 Training classroom (for lecture- and seminar-type classes, coursework, group and individual consultations, current control and intermediate attestation), equipped with a multimedia system. Specialised furniture and equipment: LENOVO ideaCentre A310 monoblock (Intel Pentium CPU P6100 @ 2.00GHz/2Gb/250Gb)- 15 pcs., Optoma x 400 multimedia projector - 1 pc., Draper Baronet NTSC (3:4) 213/84 motorised screen - 1 pc. List of licensed software: multimedia applications for lecture courses and practical sessions, interactive teaching and visual aids.	191023, St. Petersburg, Griboedova canal, 30-32, lit. A, B, P

7. METHODOLOGICAL GUIDELINES FOR STUDENTS

The following documents should be made available to the trainee before the start of the course:

- training and methodological documentation;
- local normative acts regulating the main issues of the organisation and implementation of educational activities, including those regulating the procedure for current monitoring and interim assessment of students;
- the schedule of consultations of the teaching staff.

The level and depth of mastering the discipline is determined by the active and systematic work of students in lectures, seminars, independent work, including

in terms of identifying the most significant and relevant problems for further study. A special condition for qualitative mastering of the discipline is an effective organisation of work, which allows distributing the academic workload evenly in accordance with the schedule of the educational process.

When preparing for classes, students have the opportunity to attend consultations with the staff of UNECON according to the timetable set out in the schedule of consultations.

The students' in- and out-of-classroom work should aim to form:

- the fundamentals of the learner's world view and scientific understanding;
- basic knowledge relevant to the training area and the declared professional field, forming the target and professional basis for training;
- professional competences oriented towards the needs of the labour market;
- an individual trajectory by mastering a unique set of professional competences that complement the learner's competence model, through a focus on specific professional specialised areas of knowledge defined by labour market representatives;
- meta-skills for learners, such as teamwork and leadership, data analysis, digital skills, project design and implementation, intercultural interaction.

8. SPECIFICATIONS FOR TEACHING DISABLED PERSONS

Students with disabilities, if necessary, are taught on the basis of an adapted work programme using special teaching methods and didactic materials that take into account the particularities of their psychophysical development, individual capacities and health status.

In order for disabled persons and persons with disabilities to master the curriculum, the University shall ensure that:

- for the visually impaired and visually impaired: availability of information on the timetable in accessible places and adapted forms for learners who are blind or visually impaired; presence of an assistant to assist the learner as needed; production of alternative formats of teaching materials (large print or audio files);
- for the hearing-impaired and hearing-impaired: adequate sound reproduction of information;
- for persons with disabilities and persons with mobility impairments: the possibility of unimpeded access for students to classrooms, restrooms and other areas of the department, as well as their stay in these areas.

Learners with disabilities and persons with disabilities are provided with printed and/or electronic educational resources in forms adapted to their

disabilities. The education of students with disabilities may be organised with other students or in separate groups or organisations.

ASSESSMENT RESOURCES

1.1 Control tasks and assignments for interim attestation

Is not provided by the work programme of the discipline.

1.2 Topics for written task

Is not provided by the work programme of the discipline.

1.3 Interim checkpoints

Number	Type	Method of conduct	Topic number
1	Control test	by technical means and information systems	1-9
2	Monitoring	by technical means and information systems	1-9

1.4 Other assessment objects

Is not provided by the work programme of the discipline.

1.5 Self-study

Name of self-study	Topic number
Lectures and practical classes preparation	1-9
Calculations, analyses, graphic and other tasks	1-9

1.6 Grading scale

Scales of assessment and procedures for assessing learning outcomes of the discipline are regulated by the Regulations on the current control of progress and interim attestation of students in higher education programmes and the Regulations on the scoring and rating system.

A grading and rating system is used to assess the learning outcomes of the discipline:

The final control of the discipline is an examination (or a differentiated test), the final grade being formed in accordance with the scale given in the table below:

Points	Grade
<55	failed
>=55	passed

Grading scale

2 (points to 54)	Demonstrates a lack of understanding of the problem. Many of the requirements of the assignment are not met. An initial perception of the material is demonstrated. The work is incomplete and/or plagiarised.
3 (points 55-69)	Demonstrates a partial understanding of the problem. Most of the requirements of the task have been met. Mastery of the elements of the assigned material. The material is mostly clear and coherent.
4 (points 70-84)	Demonstrates considerable understanding of the issue by the discipline. All requirements of the assignment are fulfilled. The content of the completed tasks is disclosed and examined from different perspectives.
5 (points 85-100)	Demonstrates full understanding of the problem. All requirements of the assignment are fulfilled. Demonstrates proficiency in the discipline. The completed assignments are holistic, complete, structured, present different points of view and demonstrate creativity.