

OPTIMIZATION METHODS FOR ENGINEERING FACILITIES AND PROCESSES

ANNOTATION TO THE CURRICULUM OF THE INSTITUTION OF HIGHER EDUCATION

Specialty 7-06-0714-02 Innovative technologies in mechanical engineering

Profiles: Mechanical engineering and machine science, Welding technologies, Computer engineering of transport and technological machines

Advanced higher education

	Form of higher education	
	Full-time (daytime)	Correspondence
Course	1	1
Semester	1	1
Lectures, hours	16	4
Laboratory classes, hours	16	4
Credit, semester	1	1
Class hours for the academic discipline	32	8
Independent work, hours	76	100
Total hours per academic discipline / credits	108/3	

1. Brief content of the discipline

The content of the discipline is aimed at increasing the level of professional competence in solving optimization problems in various areas of labor activity.

2. Learning outcomes:

- **to know:** theorems on the existence of minimum (maximum) points for functions on subsets of metric spaces; necessary and sufficient conditions of the first and second orders for extrema of functions on subsets of a finite-dimensional vector space; fundamentals of convex analysis and methods for studying convex optimization problems; theory of convex and linear programming; theory of non-linear programming.

- **be able to:** find minimum and maximum points for functions defined on finite-dimensional vector spaces; using differential convexity criteria to check whether a given function is convex or not.

- **have a skill:** application of methods for optimizing analytical objective functions, taking into account restrictions.

3. Formed competencies:

- Apply the methods of scientific knowledge in research activities, generate and implement innovative ideas;
- Solve research and innovation tasks based on the use of information and communication technologies;
- Provide communication, demonstrate leadership skills, be capable of team building and development of strategic goals and objectives;
- Develop innovative susceptibility and ability to innovate;
- Be able to predict the conditions for the implementation of professional activities and solve professional problems in conditions of uncertainty;
- Choose methods of mathematical modeling of technical objects and processes for manufacturing machine parts using computer technology to solve practical problems;
- Optimize the design of equipment and tooling, the technology of mechanical assembly production.

4. Requirements and forms of current and intermediate certification

The form of intermediate attestation is a test.