REPUBLIC OF UZBEKISTAN
MINISTRY OF MINING INDUSTRY AND GEOLOGY
NAVOI STATE UNIVERSITY OF MINING AND TECHNOLOGIES

Faculty of Chemistry and Metallurgy
Department of Social and Humanitarian Sciences and Physical Education

Faculty of Chemistry and Metallurgy
Department of Social and Humanitarian Sciences and Physical Education

"APPROVED"
Dean of the Faculty:
S.Sh.Sharipov

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Educational and Methodological Complex
for the Subject "Engineering Psychology"

Field of study(s): 60720800 – Mining
60710400 - Power engineering
60720400 – Technological machines and equipment
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Compiled by: Associate Professor of the Department of Social and Humanitarian Sciences, NDKI, PhD (Pedagogical Sciences) **O.R. Shamieva**
Dean of the Faculty of Energy and Mechanics, NDKI, Doctor of Pedagogical Sciences, Professor **S.J. Bozorova**
Associate Professor of the Department of General Pedagogy and Psychology, NDPI, PhD (Pedagogical Sciences) **D.A. Akhatova**

Head of the Department of Social and Humanitarian Sciences and Physical Education: Associate Professor Sh.S. Norov

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Chairperson of the Faculty Council: S.Sh. Sharipov

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LECTURE TEXTS

Module 1. Objects of Engineering Psychology

Topic 1. The main concepts, subject, objectives, and key conceptual principles of engineering psychology. Theoretical and methodological foundations of engineering psychology. Occupations and their classification. The essence of professiography (professionogram)..

Plan:

1. Engineering psychology as a scientific and applied discipline. The history of the formation of engineering psychology, its subject, objectives, and tasks. The emergence and development of engineering psychology.
2. The relationship of engineering psychology with other disciplines. Understanding engineering psychology within the system of academic subjects, and forming a scientific conception of engineering psychology as a specialized discipline.
3. Concepts of engineering psychology and technical aesthetics. Human interaction with production technologies. The human-technology system. The "Operator" as a labor subject in complex technical systems.

Engineering psychology as a scientific and applied discipline. **The history of the formation of engineering psychology, its subject, objectives, and tasks. The emergence and development of engineering psychology.** In the 21st century, in a technologically advanced society, human activity is increasingly interconnected with engineering and technical systems. The study of humans' roles in complex machines and information systems, as well as the psychological factors involved in their use, led to the development of a distinct scientific field—engineering psychology. This discipline is aimed at ensuring the compatibility of human capabilities with technical systems and plays a crucial role in enhancing safety, efficiency, and ergonomic comfort. The **Emergence and Development of Engineering Psychology**

1. Initial Stage (Up to the Early 20th Century)

- The emergence of machines and mechanisms created the need to study human interaction with technology.
- F. Taylor's scientific management theory (Taylorism) was one of the first approaches to psychologically analyzing the labor process.
- Scientists such as W. Wundt and H. Ebbinghaus studied human functions like perception, memory, reaction, and attention, laying the foundation for psychological knowledge later applied in technical systems.

2. The Formation Period of Engineering Psychology (1930–1950s)

- The emergence of automated systems, the development of transportation, and changes in aeronautical technologies made the study of human-machine interaction increasingly relevant.
- During World War II, it became clear that it was necessary to consider human psychophysiological capabilities when operating airplanes, tanks, and radars.
- During this period, the fields of ergonomics and engineering psychology were established, and specialized laboratories were created in the USA, Great Britain, and Germany.

3. The period of development and systematization (1950s–1980s)

- The concept of the "Human–Machine System (HMS)" was developed.
- The growth of cybernetics, control theory, and computer technology created a new scientific foundation for engineering psychology.
- Scientists such as D. Broadbent, G. Miller, and A. Newell developed theories of information processing.
- Psychological analysis of operator activity in automated control systems was advanced.

4. Modern Stage (1980–Present)

- Computerization, robotics, artificial intelligence, and the expansion of digital interfaces have further broadened the tasks of engineering psychology.
- Fields such as Human–Computer Interaction (HCI)**,** User Experience (UX)**,** and Digital Ergonomics have emerged.
- Psychological approaches are widely applied in areas such as virtual reality, intelligent systems, automated manufacturing, and the control of drones and robots.

The subject of engineering psychology is human activity within technical systems, including psychological capabilities and limitations, as well as the processes of interaction with technology.

The main focus is on:

- Human reception, processing of information, and decision-making
- The operator's attention, memory, perception, reaction, and thinking processes
- Human behavior and psychological state in the technical environment
- Adaptation of technical tools to human capabilities
- Identifying the psychological causes of errors in technical systems

Objectives of Engineering Psychology

- To optimally adapt humans and technology, enhancing work efficiency
- To create technical systems that are safe, convenient, ergonomic, and compatible with human capabilities
- To ensure the effectiveness and stability of operator activity
- To reduce errors in technical systems caused by human factors
- To ensure psychological safety in various technological processes

Main Tasks of Engineering Psychology

1. **Research Tasks**

- Studying human cognitive, sensory, motor, and emotional processes in the context of technical systems
- Analyzing the composition of operator labor
- Assessing human tolerance to workload, fatigue, and stress

Practical Tasks

- Ergonomic design of technical equipment and software interfaces
- Designing workplaces, control panels, and consoles based on psychological and ergonomic principles
- Developing reliable human–machine interaction schemes for automated systems
- Developing methods for operator selection, training, and professional preparation

Diagnostic Tasks

- Assessing the psychological state of operators
- Monitoring physiological and cognitive indicators
- Identifying errors related to human factors

Preventive Tasks

- Preventing stress, fatigue, and excessive workload
- Ensuring labor safety
- Enhancing the psychological comfort of the workplace

Main Directions of Engineering Psychology

Ergonomics – studying the comfort level of technical tools

1. **Psychology of Human–Machine Systems**
2. **Psychology of Operator Activity**

3. **Psychology of Automation and Robotics**
4. **Human–Computer Interaction (HCI)**
5. **Professional Psychodiagnostics**
6. **Transport, Aviation, and Space Psychology**

Conclusion
Engineering psychology plays a crucial role in the development of modern technologies. It adapts human psychological characteristics to technical systems, ensuring safety and efficiency. The advancement of this field helps in deeply studying the human factor in technical processes and creating ergonomic and comfortable work environments. Today, engineering psychology continues to develop alongside digital technologies, artificial intelligence, and automated systems.

Relation to Other Disciplines
Engineering psychology is the study of human interaction with technical systems, the psychological basis of operator activity, and knowledge related to ergonomic design of technology. This field is closely connected with many natural, technical, and social sciences and is considered an integrative scientific discipline at the intersection of engineering and psychology.

The increasing complexity of modern technical systems has further highlighted the importance of the human factor. Therefore, the subject of **engineering psychology** is taught in higher education curricula as a key component for engineering, technology, information technology, and psychology programs.

I. Interdisciplinary Connections of Engineering Psychology . Engineering psychology intersects with many scientific fields, reflecting its complex nature and interdisciplinary approach.
1. Connection with Psychology
a) General Psychology

- Perception, attention, memory, thinking, imagination, emotions, and motivation form the basis for understanding operator activity in engineering systems.
- Decision-making speed, causes of errors, and information processing capabilities of the operator are studied in this field.

b) Occupational (Work) Psychology

- Studies psychological workload, stress, fatigue, and motivation in work processes.
- Research on scientifically organizing the workplace and improving labor productivity forms the practical foundation of engineering psychology.

c) Cognitive Psychology

- Analyzes human information processing, thinking strategies, reaction, and decision-making mechanisms.
- Applied in computer interfaces, control panels, and human–computer interaction (HCI).

d) Social Psychology

- Small groups, team management, coordination, and communication are important in operator teams.
- Applied to pilots, drivers, dispatchers, and technical teams.

2. Connection with Biology and Physiology

a) Physiology

- Determines human functional capabilities, muscle activity, sensory systems (vision, hearing), and reaction speed.
- Fatigue and reflexive processes in biotechnical systems play an important role.

b) Neuropsychology

- Studies nervous system functioning, coordination functions, and the neural basis of information processes.

c) Hygiene and Occupational Medicine

- Standards for workplace hygiene, lighting, noise, vibration, and air quality are applied in ergonomic design.

Connection with Technical Sciences

a) Engineering Sciences (Mechanics, Electrical Engineering, Automation)

- The structure of technical devices and control systems is directly related to the operator's activity.
- The "Human–Machine–Environment" system is a fundamental concept in engineering psychology.

b) Information Technology

- Computer interfaces, software ergonomics, and UX/UI design are among the modern directions of engineering psychology.

c) Robotics and Automation

- Studies human interaction with robots, reliability issues in automated systems, and control psychology through sensors.

d) Cybernetics

- Involves the analysis of control systems, feedback mechanisms, and is closely connected to the operator's decision-making processes.

4. Connection with Social and Economic Sciences

a) Labor Economics

- Labor productivity, efficiency indicators, and the value of operator work are influenced by psychological factors.

b) Management

- Human resource management in technical systems, teamwork, and decision-making are important for engineering psychology.

II. Engineering Psychology as a Specialty Discipline. Engineering psychology provides specialists with the following knowledge and skills:

1. Fundamental Knowledge
   - Understanding human psychological capabilities and limitations
   - Principles of human interaction with technical systems
   - Rules of ergonomic design
   - Psychology of information processes (attention, memory, decision-making)

2. Practical Skills

- Organizing the workplace ergonomically
- Analyzing operator activity
- Assessing safety and diagnosing stress
- Applying psychological approaches in interface design
- Using methods for professional selection and certification

3. Specialist Responsibilities

- Ensuring technical devices are safe and user-friendly
- Reducing operator errors
- Improving labor productivity
- Analyzing the human factor in technological processes
- Developing psychological requirements for modern digital systems

4. Fields of Application

- Transport (aviation, railway, automobile operation)
- Industry and manufacturing
- IT and digital technologies
- Robotics and automated systems
- Military equipment and defense systems
- Healthcare (ergonomics of medical devices)

Conclusion:
Engineering psychology is an integrative scientific field bridging psychology, engineering, computer science, physiology, and other disciplines. It ensures safe, efficient, and ergonomic human activity in technical systems. In education, it teaches students to consider the human factor when designing technical devices. Specialists increase the efficiency and safety of technological processes by creating harmony between humans and technology.

3. Engineering Psychology and Technical Aesthetics Concepts

The collaboration of humans with production technologies and the human–technical system. The **operator** is a labor subject in complex technical systems.

Modern industry, automated production, information technologies, and robotics have fundamentally changed human interaction with technology. Humans no longer influence production directly through physical labor but through complex control systems. In this context, studying engineering psychology, technical aesthetics, ergonomics, and human–technical systems is crucial.

Technical Aesthetics

- Focuses on the visual appearance, shape, color, materials, structure, and design of technical devices according to aesthetic requirements.
- It ensures that devices are not only functional but also comfortable, visually appealing, and psychologically convenient.

Areas of Technical Aesthetics:

- Color harmony
- Visual appearance of control panels
- Organizational aesthetics of the workplace
- Graphic design of software interfaces
- Ergonomic design of products

Aesthetic design enhances psychological well-being, stabilizes attention, and ensures a positive emotional state for the operator.

III. Human Collaboration with Production Technologies

Technological development has shifted human labor from physical processes to intellectual management. Human interaction with technology manifests at three levels:

1. Human–Tool Stage

- Using simple hand tools (hammer, saw, knife).
- Psychological demands were minimal at this stage.

2. Human–Machine Stage

- With the advent of mechanical and electrical machines, operator activity emerged.
- Humans at this stage:
    - Monitor machine speed
    - Control processes
    - Correct technical errors

3. Human–Automated System Stage

- Modern technologies require working with:
  - Robots
  - Computers
  - Automated control systems
- Humans primarily perform monitoring, analysis, control, and decision-making, emphasizing intellectual activity.

IV. Human–Technical System (HTS)

A **Human–Technical System** is a complex system in which humans and technical devices form an interconnected control system.

Elements of HTS:

1. Human (operator)
2. Technical device (machine, panel, computer)
3. Information flow
4. Work environment (lighting, noise, microclimate)

Main Features of HTS:

- Humans and machines work interactively
- Humans control, machines execute
- Information exchange is central
- Human errors directly affect system safety

HTS efficiency depends on:

- Psychological adaptation
- Ergonomics
- Operator professional training
- Convenient technical design
- Safety requirements

V. Operator as a Labor Subject in Complex Technical Systems. The operator is a psychological agent who controls technical devices, monitors processes, receives and processes information, and makes decisions.

Main Components of Operator Activity:

1. **Information Reception**
- Visual signals
- Sounds
- Light indicators
- Sensor data
2. **Information Processing**
- Analysis
- Comparison
- Evaluation of alternatives
- Anticipation of risks
3. **Decision-Making**
- Choosing the optimal option
- Issuing commands to the technical system
- Implementing control
- Selecting the optimal option

- Issuing commands to the technical system
- Exercising control

4. Action (Practical Control)

- Pressing buttons
- Entering software commands
- Using mechanical control devices

Psychological Requirements for Operator Activity

An operator working in complex technical systems must demonstrate the following qualities:

- Fast and accurate thinking
- Stability and divisibility of attention
- Strong memory
- Resistance to stress
- Quick reaction
- Stable emotional state
- High sense of responsibility

Main Errors Encountered in Operator Activity

1. Decrease in attention due to fatigue or monotony
2. Incorrect interpretation of information
3. Slow reaction
4. Effects of stress
5. Fear or lack of confidence
6. Poor usability of technical interfaces (ergonomic errors)

Therefore, engineering psychology pays great attention to the proper organization of operator activity, ergonomic workplace design, and reduction of psychological workload.

Conclusion Engineering psychology and technical aesthetics serve to organize human activity in the technical environment in a convenient, safe, and efficient manner. The **human–technology system** is the main model of modern production, in which the operator occupies a central position. The operator's psychological state, attention, decision-making speed, and stress resistance determine the safety and efficiency of the entire technical process. Therefore, psychological, ergonomic, design, and aesthetic requirements are mandatory in the development of technical devices.

Topic 2. Theoretical and Methodological Foundations of Engineering Psychology

Lesson Plan

1. General understanding of research methods in engineering psychology
2. Diagnostic methods. Empirical-cognitive methods. Methods for analyzing and interpreting empirical data. Questionnaire method. Chronometric method. Test method. Modeling method and its types
3. Methods for studying labor activity, participant observation method. Objective recording of labor operations

Lesson Objectives

- To provide students with theoretical and practical knowledge of methods used in engineering psychology
- To differentiate various research methods and evaluate their advantages and disadvantages
- To provide practical knowledge of methods used in labor activity analysis

Teaching Methods

Explanation, illustration through examples, question–answer, analysis using graphs and diagrams

Technical Tools

Slides (PowerPoint), board, markers, worksheets (if practical tasks are assigned)

1. General Understanding of Research Methods in Engineering Psychology

Engineering psychology is a science that studies the interaction between humans and technology in production. This discipline uses various methods to examine the cognitive, emotional, and behavioral aspects of human activity.

Main Methods Used in Engineering Psychology

- Diagnostic methods
- Observation methods
- Experimental methods
- Modeling
- Statistical analysis

2. Diagnostic Methods. Empirical-Cognitive Methods. Methods of Analyzing and Interpreting Empirical Data

Diagnostic Methods

Diagnostic methods are used to identify an individual's psychological characteristics and to detect psychological problems in production environments.

Empirical-Cognitive Methods

These methods study real-life situations through observation, experiments, interviews, and tests.

Analysis of Empirical Data

- Grouping data and performing statistical analysis
- Using tables, graphs, and diagrams

Questionnaire Method. Collecting data through surveys conducted among students, workers, or users.

Chronometric Method . What Is the Chronometric Method? The chronometric method measures the duration of activities, such as the time required by an operator to complete a task. It is a research method based on accurately measuring the time taken to perform work processes or actions.

Main Purpose

- Analyzing time parameters of labor activity
- Optimizing time distribution to improve efficiency
- Measuring the time spent at each stage of work and improving the process accordingly

Essence and Tasks of the Chronometric Method

- Determining the time required to perform various operations in production;
- Identifying and eliminating unnecessary time losses;
- Optimizing time to increase the productivity of workers or operators;
- Comparing and evaluating each stage of the labor process in terms of time;
- Planning working time and evenly distributing workload.

Areas of Application of the Chronometric Method

- **Production:** measuring time in assembly, installation, and production lines;
- **Transport:** analysis of cargo handling time and movement time;
- **Office activities:** time spent on document preparation and writing processes;
- **Service sector:** cashier working time and customer service processes;
- **Sports:** analysis of athletes' movement time.

How Is the Chronometric Method Implemented?

- The researcher carefully observes the activity of the worker or operator;
- The start and end time of each work stage or movement is measured using special tools (stopwatch, chronometer);
- The obtained time indicators are recorded and analyzed;
- As a result of the analysis, excessive or unnecessary time is identified and proposals to improve efficiency are developed.

Examples of the Chronometric Method

Example 1: Measuring Assembly Work at a Factory

An assembler performs four stages when assembling a part:

- Preparation – 3 minutes
- Main assembly – 7 minutes
- Inspection – 2 minutes
- Cleaning – 1 minute

Using the chronometric method, the time for each stage is measured, and the total time equals 13 minutes. Based on this result, it is possible to determine which stage takes the most time and work on reducing it.

Example 2: Studying a Bank Cashier's Activity

When serving a customer, a cashier performs the following actions:

- Entering customer information – 1 minute
- Accepting payment – 2 minutes
- Printing a receipt – 30 seconds

Using the chronometric method, the time spent on each action is measured. If there are many customers, the total time is analyzed to determine the need to increase the number of cashiers or optimize processes.

Advantages of the Chronometric Method

- Allows accurate time-based evaluation of work activities;
- Identifies problematic or time-consuming stages in the workflow;
- Helps develop effective measures to increase productivity;
- Convenient for planning and resource allocation.

Disadvantages of the Chronometric Method

- Time measurement may sometimes create pressure on employees;

- Measuring complex and multifaceted work processes only by time may be insufficient;
- Requires time-consuming preparation and data collection.

Testing Method

 Testing Method: studying human reactions through various psychological tests and stimuli.

1. What Is the Testing Method?

The testing method is a research method carried out using specially designed tests or tasks to measure and evaluate a person's psychological, cognitive, or physical characteristics. This method allows systematic and accurate assessment of knowledge, abilities, skills, reaction speed, attention level, and other indicators.

2. Main Tasks of the Testing Method

- Assessing a person's skills, knowledge, and abilities;
- Determining job suitability or level of special training;
- Measuring psychological state, stress resistance, and other characteristics;
- Checking the level of knowledge in the educational process;
- Evaluating and improving performance efficiency.

Types of Testing Methods

- **Psychological tests:** measuring intelligence, attention, memory, and logical thinking;
- **Physical tests:** determining strength, endurance, speed, and other physical indicators;
- **Professional tests:** assessing skills required for a job;
- **Cognitive tests:** evaluating information processing and decision-making abilities.

Fields of Application of the Testing Method

- **Personnel selection:** identifying candidates suitable for a position;
- **Education:** assessing students' knowledge and skills;
- **Psychology:** examining psychological states;
- **Labor activity analysis:** evaluating work performance;
- **Sports:** assessing athletes' physical fitness and psychological condition.

Advantages of the Testing Method

- Data is collected accurately and systematically;
- Allows identification of individual differences;
- Convenient for processing and comparison;
- Effective in assessing job suitability.

Disadvantages of the Testing Method

- Tests may not fully reflect all abilities of a person;
- Test-trained individuals may influence results;
- Incorrect application of tests affects reliability.

Examples

- **Example 1: Reaction Time Test**
  A test is conducted to study an operator's ability to respond quickly to emergency situations in production. Reaction time to signals is measured using special equipment.
- **Example 2: Intelligence Test**
  Standard intelligence tests (IQ tests) are used to assess logical thinking and problem-solving abilities of newly recruited engineers.
- **Example 3: Physical Endurance Test**
  Maximum strength and endurance tests are conducted to determine the work suitability of load-handling workers.

Practical Task on Applying the Testing Method

Task: Develop a psychological test consisting of 5 questions to be used in the selection of new workers in a manufacturing enterprise.

Modeling Method

 Modeling Method: studying human behavior by artificially creating a real environment.

Models:

- Physical models (simulators);
- Mathematical models (algorithmic);
- Computer models.

3. Methods of Studying Labor Activity and Participatory Observation

👀 **Participatory Observation:** the psychologist or researcher participates together with employees at the workplace and directly observes their activities.

 Objective Recording of Labor Operations:

- Video recording of actions, decisions, and reactions;
- Analysis based on criteria such as number of errors and quality of performance.

💼 **Stages of Labor Activity Analysis:**

1. Identifying the type of activity and problematic areas;
2. Selecting an analysis method;
3. Collecting data;
4. Analyzing data;
5. Drawing conclusions and making recommendations.

Conclusion. Research in engineering psychology is conducted on an empirical basis. Each method has its own advantages and disadvantages and is selected depending on specific tasks. Diagnostic, modeling, observation, and chronometric methods are of great importance in analyzing real work activities.

Homework. 📝 Analyze which methods are applied to a profession of your choice (e.g., operator, programmer, driver). Design a questionnaire with at least 5 questions.

✅Test Questions (10 questions, 1 correct answer)

1. What does engineering psychology study?
A) Only technology
B) The role of humans in society
C) The interaction between humans and technology
D) Social aspects of types of activities
Correct answer: C

2. Which of the following belongs to diagnostic methods?
A) Chronometric method
B) Questionnaire method
C) Labor modeling
D) Conducting an interview
Correct answer: B

3. What kind of activity is carried out based on empirical methods?
A) Creating theoretical models
B) Collecting data based on real experiments
C) Drawing graphs
D) Conducting only statistical analysis
Correct answer: B
4. What is measured using the chronometric method?
A) Quality of reaction
B) Employee's mood
C) Time of task performance
D) Level of modeling
Correct answer: C
5. In which case is the modeling method applied?
A) Only for evaluating employees
B) When artificially creating a real situation
C) When distributing questionnaires
D) When calculating test results
Correct answer: B
6. Which of the following is NOT an empirical-cognitive method?
A) Observation
B) Questionnaire

C) Mathematical model
D) Interview
Correct answer: C

7. How is participatory observation conducted in studying labor activity?
A) Observation through a camera
B) Interview by an external auditor
C) The researcher directly participates at the workplace
D) Conducting psychological tests
Correct answer: C

8. What is meant by objective recording of labor operations?
A) Internal thoughts of the worker
B) Subjective evaluation
C) Accurate recording of actions and results
D) Employees' dissatisfaction
Correct answer: C

9. What is the main purpose of the questionnaire method?
A) Automating production
B) Determining the number of employees
C) Collecting information about the subject
D) Modeling activity
Correct answer: C

10. Which of the following methods is considered a testing method?
A) Observation using a camera
B) A psychological test measuring reaction time
C) Interview
D) Creating tables
Correct answer: B

✅1. Theoretical Tasks and Answers – Translation

Task 1: Define the concepts

Term	Definition	Example
Diagnostic method	Methods that identify a person's psychological state and characteristics	Conducting a stress-level test for employees
Empirical method	Methods studied through data collected from real-life situations	Direct observation of employee activity
Modeling	Studying by creating an artificial or schematic representation of a real environment	Creating an emergency simulation on a computer
Questionnaire	Method of collecting information using pre-prepared questions	Survey about employee satisfaction
Chronometric method	Method for determining the time required to perform an action or task	Measuring the time an operator takes to complete an order

📊 Task 2: Fill in the table

Method Name	Purpose	Field of Application	Advantage
Observation	Observe activity in natural conditions	Any production environment	Provides real data
Questionnaire	Identify personal opinions and feelings	HR, sociological research	Covers many participants quickly
Modeling	Artificially recreates the process	Safety, training	Allows safe analysis of difficult situations
Chronometric method	Measure time spent	Work productivity	Provides accurate time analysis

⏱ Task 3: Comparison Answer

Aspect	Questionnaire Method	Participatory Observation Method
Data collection form	Through written questions	Direct participation in activity
Reliability	Medium (answers may be subjective)	High (real activity is analyzed)
Advantage	Can quickly study many people	Real-time, precise observation
When useful	When general opinions are needed	When identifying real workplace problems

🛠 2. Practical Tasks and Sample Answers

👥 Task 4: Sample Questionnaire Project

Topic: Level of fatigue among operators at work

Questions:

1. At what time of day do you feel the most tired?
2. How many breaks do you take during the day?
3. Do you feel the working conditions tire you? (Yes/No)
4. What problems are most noticeable on stressful days?
5. Do you receive sufficient psychological support from your supervisors?
6. What do you think should be done to improve working conditions?

⏱ Task 5: Sample Chronometric Observation

Profession: Chef

Process: Preparing one dish

Stage	Action	Time (minutes)
Preparation	Collecting and washing ingredients	5
Cutting	Chopping vegetables	7
Cooking	Cooking on stove	15
Garnishing & serving	Decorating and serving	3
Total time:		**30 minutes**

Analysis: Most time is spent on cooking. Time can be saved by modernizing gas cooking equipment.

🔎 **Task 6: Analysis Based on Real Observation**

Activity type: Librarian work

Observation time: 20 minutes

Observed actions:

- Gave books to 5 students
- Registered 3 books
- Performed computer searches
- Answered the phone

Conclusion: Multiple tasks are performed simultaneously. Attention is divided, which accelerates fatigue. An assistant is needed at the workplace.

Topic 3. Professions and Their Classification. The Essence of Professiography (Professionogram)

Outline:

1. Professions and their classification. Psychological classification of professions.
2. Psychological systematization of professions. Differential-typological approach (E.A. Klimov's concept; J. Holland's concept of personality vocational preferences and vocational environment typology). Classification of professions developed for career guidance and vocational counseling (E.A. Klimov).
3. Basic concepts of psychological study of professions: professiography, professionogram, specialist psychogram. Principles and tasks of professiography.

Professions and Their Classification. Psychological Classification of Professions

1. The Concept of Profession

A profession is a type of socially useful labor activity that requires specific knowledge, skills, and competencies and serves to satisfy a person's material and spiritual needs.

- Choosing a profession is one of the most important decisions in a young person's life, as it affects not only economic security but also one's place in society, life satisfaction, and psychological stability.

2. General Classification of Professions

Professions can be grouped according to various criteria:

A) By the Object of Labor:

1. **Nature-related professions** — agronomist, veterinarian, biologist, ecologist, farmer.
2. **Technology-related professions** — engineer, technologist, mechanic, machine builder, construction worker.
3. **People-oriented professions** — teacher, doctor, psychologist, lawyer, sociologist.

4. **Professions related to sign systems** — programmer, accountant, bookkeeper, mathematician, linguist.
5. **Artistic and creative professions** — artist, actor, writer, composer, designer.

B) By Working Conditions:

- Professions performed in offices or indoor environments;
- Professions performed outdoors;
- Professions requiring special conditions (laboratories, factories, underground, at sea, etc.).

C)* By Types *of* Labor Activity*:

- **Intellectual** (related to knowledge, analysis, creativity);
- **Practical** (manual labor, working with technology);
- **Service-oriented** (direct interaction with people);
- **Creative** (art, design, creative production).

3. Psychological Classification of Professions (According to E.A. Klimov)

In psychology, professions are usually divided into five major groups based on the object of labor:

1. "Human – Nature"

- Activities related to natural objects (plants, animals, soil, water, atmosphere).
- Professions: agronomist, livestock specialist, biologist, veterinarian, geologist, ecologist.
- Required qualities: observation skills, love for nature, endurance, patience, responsibility.

2. "Human – Technology"

- Activities involving technical tools, machines, mechanisms, and materials.
- Professions: mechanic, engineer, auto mechanic, builder, electrician.
- Required qualities: attention, precise calculation skills, manual-technical abilities, technical thinking.

3. "Human – Human"

- The main object of activity is other people.
- Professions: teacher, doctor, psychologist, lawyer, manager, diplomat.
- Required qualities: communication skills, patience, empathy, ability to listen and explain, leadership.

4. "Human – Sign System"

- Working with numbers, letters, codes, formulas, graphs, and diagrams.
- Professions: programmer, mathematician, accountant, statistician, archivist.
- Required qualities: concentration, logical thinking, good memory, accuracy, consistency.

5. "Human – Artistic Image"

- Activities related to art, visual and musical images, design, and creativity.
- Professions: artist, actor, writer, sculptor, designer, musician.

- Required qualities: aesthetic sense, imagination, creative thinking, sensitivity, emotional richness.

4. Psychological Factors Influencing Career Choice

- **Interests and inclinations** — choosing a profession aligned with personal interests;
- **Abilities and talents** — innate abilities are necessary for success in certain professions;
- **Temperament and character** — the type of activity should match personal traits;
- **Motivation** — material benefits, social status, and personal development needs;
- **Health condition** — some professions require physical strength, good vision, hearing, or psychological stability.

5. Social Importance of Professions

- Ensure the material and spiritual development of society;
- Determine a person's socialization and place in society;
- Diversity of professions contributes to the development of the economy, science, culture, and art.

Conclusion Professions are among the most important social and psychological categories in human life. Their classification is based on the object of labor, working conditions, and type of activity. In psychology, the classification proposed by E.A. Klimov — *"Human–Nature," "Human–Technology," "Human–Human," "Human–Sign System," and "Human–Artistic Image"* — is considered fundamental. Choosing a profession that corresponds to an individual's psychological characteristics, interests, and abilities is a key factor in achieving success and life satisfaction.

Psychological Systematization of Professions

Psychological systematization is the ordering of professions based on a person's personality traits, abilities, interests, and types of mental activity.

- The main focus is on compatibility between the individual and the profession.
- The better a person's psychological type matches their chosen profession, the higher their job satisfaction, success, and social status.

Differential-Typological Approach This approach studies professions by dividing them into types and helps identify professions suitable for a person by determining which type they belong to. The two most well-known approaches are:
A) E.A. Klimov's Concept

1. "Human – Nature"

- Working with plants, animals, land, water, and the atmosphere.
- Professions: agronomist, biologist, ecologist, veterinarian.
- Required qualities: observation skills, love for nature, patience, endurance.

2. "Human – Technology"

- Working with machines, mechanisms, and materials.
- Professions: engineer, mechanic, construction worker, electrician.
- Required qualities: technical thinking, accuracy, logical reasoning.

3. "Human – Human"

- Communication with people, education, treatment, and service activities.
- Professions: teacher, doctor, psychologist, lawyer, diplomat.
- Required qualities: empathy, communicative skills, patience, organizational abilities.

4. "Human – Sign System"

- Working with letters, numbers, formulas, graphs, drawings, and codes.
- Professions: programmer, accountant, economist, mathematician.
- Required qualities: logical thinking, accuracy, good memory, concentration.

5. "Human – Artistic Image"

- Related to art, culture, and creative activity.
- Professions: artist, writer, actor, composer, designer.
- Required qualities: creativity, aesthetic sense, imagination, sensitivity.

📌 **Klimov's approach** is widely used not only for classifying professions but also for career guidance and counseling of young people. He developed methods for identifying students' interests and their proximity to specific types through psychological tests and questionnaires.

B) J. Holland's Concept. American psychologist **John Holland** divided both professions and personalities into **six types**. According to his theory, people and work environments should match each other. When a person works in an environment corresponding to their type, they achieve higher performance and job satisfaction.

Holland's Six Types:

1. Realistic Type (R) – "Practical"

- Related to physical labor, technology, mechanisms, and nature.

- Professions: construction worker, engineer, mechanic, agronomist.

2. Investigative Type (I) – "Intellectual"
- Prefers analysis, research, and scientific activity.
- Professions: scientist, mathematician, biologist, programmer.

3. Artistic Type (A) – "Creative"
- Oriented toward art, creativity, and image creation.
- Professions: writer, artist, actor, composer, designer.

4. Social Type (S) – "Social"
- Focused on helping people, education, healthcare, and communication.
- Professions: teacher, doctor, psychologist, social worker.

5. Enterprising Type (E) – "Entrepreneurial"
- Leadership, initiative, managing people, and business activities.
- Professions: manager, politician, lawyer, entrepreneur.

6. Conventional Type (C) – "Conventional"
- Prefers structured, accurate, and rule-based work.
- Professions: accountant, archivist, secretary, economist.

📌 In Holland's concept, a person usually has a **dominant type**, but elements of other types may also be present. Therefore, vocational guidance determines a **combined personality profile**.

3. Classifications Created for Career Guidance and Counseling (Klimov). E.A. Klimov classified professions not only by the object of labor but also by **types of work activity** to guide young people effectively:

- **Practical professions** — related to technology and nature (mechanic, agronomist).
- **Scientific professions** — research and theoretical activity (scientist, mathematician).
- **Creative professions** — art, design, image creation.
- **Organizational professions** — leadership, management, organization.
- **Communicative professions** — interaction and service involving people (teacher, psychologist).

📌 This classification helps psychologists and educators select the most suitable professions for young people based on:
- interests,
- psychological capabilities,
- intellectual level,
- character traits.

4. Conclusion. Psychological systematization of professions aims to identify compatibility between the individual and the profession.

- Klimov classified professions into five types based on the "Human–Object" principle, widely used in vocational counseling.
- Holland developed six personality and environment types, providing a deeper understanding of vocational compatibility.
- Psychological classification in career guidance helps young people choose professions aligned with their interests and abilities, ensuring future success.

Basic Concepts in the Psychological Study of Professions

Occupational psychology studies human activity in the processes of career choice, professional adaptation, and professional development. Several key concepts are used in the psychological study of professions:

1. Professiography

Professiography is a method of comprehensive study of a profession from psychological, physiological, pedagogical, and social perspectives. Simply put, it is the process of creating a complete description of a profession.

Objectives:

1. To identify the essence of a profession, the labor process, and its psychological requirements;
2. To determine the knowledge, skills, and qualities required for professional activity;
3. To provide a scientific basis for career guidance and career choice;
4. To offer psychological support in professional adaptation, training, and personnel development.

Practical Applications:

- Career counseling;
- Professional development and retraining;
- Development of vocational selection tests;
- Increasing labor efficiency.

2. Professionogram. Definition: A professionogram is a descriptive document of a specific profession—an analytical scientific document prepared based on professiographic research.

Structure:

1. General information: name of the profession, field, history, social significance;
2. Objects of labor: technology, nature, people, sign systems, or images;
3. Working conditions: indoor, outdoor, hazardous, or comfortable environments;
4. Professional requirements: knowledge, skills, abilities, and personal qualities;
5. Health requirements: physical and psychological limitations (e.g., good vision and fast reaction for pilots);
6. Career development prospects: professional growth, promotion, mastering new technologies.

Significance: The professionogram is a key document in career guidance, aligning individual capabilities with professional requirements, and providing psychological counseling.

3. Specialist Psychogram. A specialist psychogram is the psychological profile of a professional, reflecting the set of mental qualities and individual characteristics required for successful performance.

Content:

1. Cognitive qualities: thinking, memory, attention, analytical abilities;
2. Emotional qualities: stress resistance, stability, emotional control;
3. Volitional qualities: determination, independence, responsibility, discipline;
4. Communication qualities: ability to work with people, empathy, leadership;
5. Temperament and character: psychotype appropriate to professional requirements.

Examples:

- **Pilot's psychogram:** fast reaction, high attention, ability to remain calm in dangerous situations.
- **Teacher's psychogram:** patience, communication skills, pedagogical tact.

4. Principles of Professiography

The main principles applied in the psychological study of professions are:

1. **Scientific validity** — information about a profession must be based on scientific research, observation, and analysis.
2. **Comprehensive approach** — a profession is studied not only from a psychological perspective, but also from physiological, pedagogical, and social aspects.
3. **Practical applicability** — the obtained data should be used in career choice, counseling, and personnel training.
4. **Person-centered orientation** — professional descriptions should be adapted to an individual's interests, abilities, and health.
5. **Compatibility** — the degree to which an individual's personal characteristics match the requirements of a profession is determined.
6. **Dynamic nature** — professiography must be regularly updated in response to professional development and the emergence of new technologies.

5. Functions of Professiography

- Systematizing professions and developing their comprehensive descriptions;
- Designing diagnostic methods for professional selection;
- Supporting career guidance and vocational counseling for young people;
- Developing psychological recommendations to improve work efficiency;
- Facilitating professional adaptation by helping new employees adjust more quickly;
- Maintaining occupational health by monitoring physical and psychological well-being;
- Improving the educational process by aligning curricula with professional requirements.

Conclusion. In the psychological study of professions: Professiography **is the process of in-depth analysis of a profession;**

- **Professionogram** is the written description of a profession;
- **Psychogram** is the psychological profile of a professional.

These concepts make it possible to guide young people toward appropriate career choices, provide psychological counseling, and support professional development. Professiography must be scientific, comprehensive, practical, person-oriented, and dynamic.

Psychological Study and Classification of Professions. 1. The Concept and Essence of a Profession. A **profession** is a socially useful form of human labor activity that requires specific knowledge, skills, and competencies, satisfies individual needs, and contributes to societal development. Career choice is one of the most important decisions in a person's life, as it directly affects not only material well-being but also personal satisfaction, self-realization, social status, and psychological stability. Professions should be studied not only from economic or technical perspectives but also psychologically. The better an individual's personal characteristics correspond to professional requirements, the higher their success and job satisfaction.

2. General Classification of Professions. Professions can be classified according to various criteria:

- By object of labor: working with nature, technology, people, sign systems, or artistic images;
- By working conditions: office-based, outdoor, or special-condition professions;
- By type of activity: intellectual, practical, service-oriented, creative;
- By social significance: production, management, services, education, and arts.

These classifications demonstrate the complex nature of the professional system.

3. Psychological Classification of Professions. E.A. Klimov's Concept. Klimov divided professions into five groups based on the object of labor:

1. **"Human – Nature"** (biologist, agronomist, veterinarian, ecologist);
2. **"Human – Technology"** (engineer, mechanic, construction worker);
3. **"Human – Human"** (teacher, doctor, psychologist);
4. **"Human – Sign System"** (mathematician, accountant, programmer);
5. **"Human – Artistic Image"** (artist, writer, actor, designer).

This classification is one of the most widely used systems in career guidance.

J. Holland's Concept . American psychologist **John Holland** classified personality types and work environments into six categories:

1. **Realistic (R)** — practical work, technology, nature (mechanic, agronomist);
2. **Investigative (I)** — scientific research and analysis (scientist, programmer, mathematician);
3. **Artistic (A)** — art, creativity, imagery (actor, designer, writer);
4. **Social (S)** — working with people and helping professions (teacher, doctor, psychologist);
5. **Enterprising (E)** — leadership, initiative, business (manager, politician);
6. **Conventional (C)** — structured and systematic work (accountant, archivist).

According to Holland, individuals usually possess elements of several types, but one type tends to dominate. When a person works in an environment that matches their type, they achieve the greatest success.

4. Core Concepts in the Psychological Study of Professions

4.1. Professiography

- A scientific, comprehensive, and systematic method of studying professions;
- Purpose: to identify the essence of a profession, required knowledge, skills, and psychological qualities;
- Application: career guidance, professional selection, counseling, and personnel training.

4.2. Professionogram

- A written scientific description of a specific profession;
- Includes general characteristics, working conditions, professional requirements, health limitations, and career prospects;
- Serves as a key document in career guidance.

4.3. Psychogram

- The psychological profile of a professional;
- Includes attention, memory, thinking, emotional stability, willpower, communication skills, and temperament;
- For example, fast reaction is crucial for pilots, empathy for doctors, and patience for teachers.

5. Principles of Professiography

1. Scientific grounding;
2. Comprehensive analysis of psychological, physiological, pedagogical, and social factors;
3. Practical applicability;
4. Person-oriented approach;
5. Compatibility between individual abilities and professional requirements;
6. Continuous updating in response to technological change.

6. Functions of Professiography

- Classification and description of professions;
- Development of vocational selection tests;
- Support for career guidance and counseling;
- Facilitation of professional adaptation;
- Improvement of work efficiency;
- Monitoring occupational health;
- Alignment of educational programs with professional demands.

7. Final Conclusion

The psychological study of professions is an important scientific field aimed at ensuring compatibility between individuals and professions and helping people choose careers that match their interests and abilities.

- Klimov classified professions into five types based on the "human–object" model.
- Holland identified six personality and environment types to determine vocational compatibility.
- Professiography represents the scientific study of professions, the professionogram is their written description, and the psychogram is the psychological profile of professionals.
- Their main purpose is to guide young people in career choice, enhance work efficiency, facilitate professional adaptation, and support societal development.

Topic 4. Human–Technology Interaction

Outline:

1. Human–technology interaction
2. Objects of an operator's work in the production process. Operator's tasks in labor activity. Psychological structure of operator activity
3. Information exchange in the human–machine system
4. The influence of machine characteristics on work activity

Introduction. Throughout history, humans have created various technical tools in order to satisfy their needs, facilitate labor, and improve the quality of life. The path of development from primitive mechanical tools to modern artificial intelligence represents the inseparable result of human–technology interaction. In the contemporary world, technology has penetrated almost all spheres of human activity, including healthcare, education, industry, transport, information technologies, and even everyday life.

What is technology, and why does humanity need it?
Technology is a set of tools, devices, machines, and software created by humans to perform specific functions.

Without technology, humans would be unable to:

- Perform large-scale work;

- Carry out operations requiring speed and precision;
- Transmit information quickly and efficiently;
- Remain competitive in modern production.

Forms of Human–Technology Interaction

1. **Facilitation of physical labor**
   Examples include conveyor lines, agricultural machinery, and robotic production systems.
2. **Automation of intellectual labor**
   Computer programs, artificial intelligence, and data analysis systems support human cognitive activity.
3. **Information exchange**
   The Internet, mobile communication, and cloud technologies enable rapid and efficient information transfer.
4. **Medicine and rehabilitation**
   Prosthetic devices, rehabilitation equipment, diagnostic tools, and robotic surgery systems support the restoration of human health.

Advantages and Risks of Human–Technology Interaction

Advantages:

- Increased labor productivity;
- Reduced physical effort;
- Improved quality of life;
- New opportunities (e.g., online education, remote work).

Risks:

- Reduction of job opportunities;
- Excessive dependence on technology;
- Privacy and information security issues;
- Potential loss of control over artificial intelligence in the future.

Future of Human–Technology Interaction

- Artificial intelligence will increasingly function as a human assistant;
- Autonomous robots will make independent decisions in production;
- Human–machine integration will intensify through brain–computer interfaces (BCI);
- Technical literacy will become an essential skill for every individual.

Conclusion. Human–technology interaction is the foundation of modern development and progress. However, technological advancement brings not only benefits but also responsibility. Therefore, it is essential for individuals to understand technology, use it properly, and interact with it safely.

2. Objects of an Operator's Work in the Production Process. Modern industry and production processes are based on various levels of automated systems. In these processes, humans—operators—continue to play a crucial role. Operators not only control technical equipment but also make important decisions, ensure safety, and maintain system reliability. The effectiveness of an operator's work largely depends on the objects with which they interact, their characteristics, and the degree of operator influence on them.

The Concept of an Operator. An **operator** is a person who controls, monitors, or directly participates in automated or semi-automated technological processes within a production system.

Main duties of an operator:

- Controlling and monitoring processes;
- Adjusting equipment settings;
- Identifying and eliminating malfunctions;
- Quality control;
- Ensuring occupational safety.

Objects of an Operator's Work

The objects of an operator's work include technical, technological, informational, and physical elements with which the operator interacts during professional activity.

1. **Technological process**
   Core production operations such as cutting, pressing, or heat treatment, which the operator continuously monitors and controls.
2. **Technical equipment (machines, devices, tools)**
   Equipment operated or adjusted by the operator, such as CNC machines or automated conveyor systems.
3. **Processed product (workpiece)**
   The operator monitors product quality, dimensions, and production stages.
4. **Control panels and interfaces**
   The communication medium between the operator and the machine, including screens, buttons, keyboards, and touch panels.
5. **Information (sensor data and indicators)**
   Data obtained from measuring instruments such as temperature, pressure, speed, and energy consumption, used for decision-making.
6. **Safety systems**
   Emergency alarms, interlocking systems, and emergency stop buttons monitored by the operator.

Practical Examples. Example 1: CNC Machine Operator

- Objects: machine tool, control panel, parts, measuring instruments
- Tasks: program loading, tool setup, quality inspection

Example 2: Chemical Plant Operator

- Objects: reactor, sensors, monitoring systems
- Tasks: controlling chemical reactions, managing temperature and pressure

Example 3: Power Grid Dispatcher

- Objects: power transmission systems, charts, automated devices
- Tasks: managing energy flow, detecting failures

Conclusion. The operator's role in production continues to evolve alongside technological progress. Although systems are becoming more complex, the operator remains a key human factor. Human abilities such as reasoning, evaluation, decision-making, and crisis adaptation distinguish people from machines. A modern operator is a professional who controls technology, analyzes information, and makes responsible decisions.

Lecture: Operator Tasks in Labor Activity. Psychological Structure of Operator Activity

Introduction

Rapid technological development, automation, robotics, and digital systems have fundamentally transformed operator work. A modern operator not only controls equipment but also analyzes data, makes decisions, monitors systems, and ensures safety. Psychological factors such as attention, memory, decision-making ability, stress resistance, and rapid thinking directly influence production efficiency.

Main Tasks of an Operator

1. **Process control**
   Starting, monitoring, and stopping machines or technological lines; adjusting operational parameters such as temperature, pressure, and speed.
2. **Information processing**
   Monitoring system status via sensors, indicators, and graphs; receiving, analyzing, and archiving data.
3. **Monitoring and inspection**
   Continuous quality control using automatic or manual inspection tools.
4. **Fault detection and elimination**
   Identifying causes of malfunctions and either resolving them independently or reporting to maintenance personnel.
5. **Ensuring safety**
   Compliance with occupational safety rules and use of emergency systems.

6. **Documentation and reporting**
   Recording production parameters, malfunctions, measurements, and product conditions.

Psychological Structure of Operator Activity. Operator activity involves high mental workload and includes the following psychological components:

1. **Perceptual activity**
   Visual and auditory perception of system states and correct interpretation of sensor data.
2. **Attention (concentration)**
   Sustained attention to slow but critical information flows over long periods.
3. **Memory**
   Retention of previous experiences, signal patterns, and operational sequences.
4. **Thinking and analysis**
   Identifying causes of system changes and evaluating their consequences.
5. **Rapid and accurate decision-making**
   Decisions must sometimes be made within seconds; delays or errors can cause accidents or damage.
6. **Stress resistance**
   Emotional stability and self-control under high responsibility and emergency conditions.

Psychological Factors Influencing Operator Performance

- Noise, lighting, and temperature of the working environment;
- Length of working shifts;
- Individual or team-based work conditions;
- Working with abstract information such as digital graphs and indicators.

Final Conclusion. A modern operator is a highly responsible and multifunctional professional. In addition to controlling technical systems, operators analyze information, ensure safety, and maintain system reliability. Therefore, operator training must consider psychological characteristics, monitor mental well-being, and optimize working conditions to ensure efficiency and safety.

I. Review Questions

1. What are the main responsibilities of an operator?
2. What role do attention and memory play in an operator’s work?
3. Which psychological factors influence decision-making?
4. What are the sources of stress in an operator’s job?
5. What psychological requirements are placed on operator activity?

II. Q&A Questions (According to Outline 1)

1. How does technology change human life?
2. In which fields is technology application most interesting to you?
3. What are the negative aspects of over-reliance on technology?
4. In your opinion, what is the most effective form of cooperation between humans and technology?

III. Test Questions (10 questions, 1 correct answer each)

1. In which system is human–technology interaction realized?
   A) Activity system
   B) Biological system
   C) Mechanical system
   D) Chemical system
   Correct answer: A
2. What does the field of ergonomics study?
   A) The structure of technology
   B) Human health
   C) Compatibility between humans and technology
   D) Economic aspects of activity
   Correct answer: C
3. Which of the following is an example of a human–machine system?
   A) Reading a book
   B) Driving a tractor
   C) Climbing a mountain
   D) Drinking water
   Correct answer: B
4. What is the main goal of human–machine systems?
   A) To fully replace humans
   B) To stop production
   C) To facilitate human labor and increase efficiency
   D) To make technology more complex
   Correct answer: C
5. As automation increases, how does human involvement change?
   A) Increases
   B) Remains the same
   C) Decreases
   D) Completely disappears
   Correct answer: C
6. What is necessary to ensure the most effective human–technology interface?
   A) Powerful technology
   B) Software
   C) Ergonomic design
   D) Expensive equipment
   Correct answer: C

7. How can robots cooperate with humans?
   A) Work independently only
   B) Work only under commands
   C) Work both cooperatively and independently
   D) Only for hazardous tasks
   Correct answer: C
8. Which field connects human intellectual activity with technology?
   A) Bionics
   B) Ergonomics
   C) Artificial intelligence
   D) Psychology
   Correct answer: C
9. What is the role of humans in automated systems?
   A) No role
   B) Active controller
   C) Technical assistant only
   D) Observer and coordinator
   Correct answer: D
10. What can happen if human–machine systems are poorly designed?
    A) Efficiency increases
    B) Safety improves
    C) Work quality decreases
    D) Technology costs decrease
    Correct answer: C

IV. Practical Exercises. Exercise 1: Identify examples of human–technology cooperation

Activity	Is there human–technology cooperation?	Explanation
Creating documents on a computer	✓	The computer is involved as technology
Reading a book	✗	No technology involved
Driving a car	✓	The driver operates the vehicle
Writing with a pen	✗	Purely human activity
Assembly using a robot	✓	Robot is the technological tool
Communicating via	✓	Technology enables

Activity	Is there human–technology cooperation?	Explanation
phone		communication

Exercise 2: Analyze a simple human–technology system. Choose one: **ATM, automatic washing machine, smartphone, electric scooter** Describe:

- Human role (command, control, monitoring)
- Technology's role
- Benefits expected from cooperation
- Possible issues

Exercise 3: Ergonomic assessment project. Task: **Evaluate a device you use (computer, smartphone, keyboard, chair, mouse) from an ergonomic perspective.**
Instructions:

1. Identify ergonomic aspects (comfort, placement, effect on health)
2. Note drawbacks and suggest improvements
3. Prepare a one-page report (with optional diagram or sketch)

Exercise 4: Evaluate human involvement in automated systems. Task: Identify tasks for humans in an automated production line. **Describe:**

- Human work (monitoring, controlling, ensuring safety)
- Technology role (sensors, programming, execution)
- Efficiency results from cooperation

Example: Automatic packaging line – sensors detect products, humans monitor.

Exercise 5: Role-playing (group activity)

Task: Divide into groups and play the following roles:

1. HR representatives
2. Engineers (design technology)
3. Ergonomics specialists
4. Users (workers)

Activity: Present coordinated cooperation for a new technological device (e.g., a new type of cleaning robot). Each group performs its role and explains its perspective.

1. Open-Ended Questions (Control Questions – Plan 2)

1. What do you understand by the term “operator”?
2. What objects are included in an operator’s work?
3. Which part of the operator’s activity is connected to the technological process?
4. How is the control panel considered as an object?
5. How does an operator work with information?
6. How is the product considered an object for the operator?
7. What role do safety systems play in the operator’s work?
8. Give examples of communication tools between the operator and technology.
9. List the work objects of a CNC machine operator.
10. From which sources does the operator receive information flow?

✅2. Test Questions (1 correct answer)

1. What is the main work object of the operator?
   A) Work clothing
   B) Machines, equipment, and control panel
   C) Product advertisements
   D) Warehouse items
   Answer: B
2. What is the significance of the control panel for the operator?
   A) Only decorative
   B) Slows down work
   C) Tool for adjusting and controlling equipment
   D) Provides audible signals
   Answer: C
3. Which of the following is not part of the operator’s work object?
   A) Production product
   B) Sensors
   C) Employee schedules
   D) Equipment
   Answer: C
4. One of the main tasks of the operator is:
   A) Preparing financial reports
   B) Controlling equipment and monitoring the process
   C) Developing marketing strategy
   D) Inventory management
   Answer: B
5. Operator’s work with information is based on:
   A) Only theoretical knowledge
   B) Sensors, indicators, and monitoring systems
   C) Personal opinions and assumptions
   D) Handwritten notes
   Answer: B

🛠 3. Practical Tasks. ◆ Task 1: Analyze Operator Work Objects

Instructions: Choose one profession and describe which objects the operator interacts with:

- CNC machine operator
- Chemical production operator
- Thermal power plant operator
- Conveyor line operator

Include:

- Technological process
- Technical equipment
- Control tools
- Information sources
- Safety elements

Sample Answer (CNC Operator):

- **Technological process:** Machining parts (cutting, drilling, milling)
- **Technical equipment:** CNC machine, motors, machine parts
- **Control tools:** Keyboard, touchscreen, programming interface
- **Information sources:** Sensor readings, display measurements, signal lights
- **Safety elements:** Protective cover, emergency stop button, hazard zones

◈ Task 2: Draw a Diagram of Operator–Object Interaction Instructions: Show how the operator interacts with different objects in a production system using a block or flow diagram.
Example: Operator → Sensors → Control Panel → Equipment → Product

◆ Task 3: Operator Actions in Malfunction Scenario
Scenario: A temperature sensor shows 50°C, but the real temperature is 80°C.

Student Task:

- How to detect the malfunction
- Possible hazards
- Operator's actions
- How to ensure system safety

Sample Answer:

1. Detect the issue using visual or audible signals.
2. Assess the situation using readings (thinking + analysis).
3. Take immediate action (e.g., stop the machine or adjust parameters).
4. Ensure safety (press emergency stop if danger is high).
5. Document the incident and report to supervisor or technical service.

Sample Answers to Open-Ended Questions

1. **Operator:** A person who controls technical equipment, monitors the technological process, and manages it.
2. **Objects in operator's work:** Technological process, technical equipment (machines, tools), control panels, product, information systems, safety systems.
3. **Technological process relation:** The operator monitors and controls the process, ensuring continuity and quality.
4. **Control panel as an object:** Main interface between operator and equipment for giving commands and monitoring system status.
5. **Working with information:** Data from sensors and measuring devices is provided in real time; operator analyzes it and makes decisions.
6. **Product as an object:** Observed, monitored, and quality-assessed by the operator; can be affected directly or indirectly.
7. **Safety systems:** Detect malfunctions, prevent emergencies, and protect the operator.
8. **Communication tools:** Touchscreens, buttons, LED indicators, audible alarms, sensors, software interfaces.
9. **CNC operator work objects:** Control panel, cutting tools, workpiece, software, sensors, measuring devices.
10. **Sources of information:** Sensors, monitoring systems, indicators, display monitors, alarms.

🛠 Practical Tasks and Sample Answers

◆ Task 1: Analyze Operator Work Objects

Profession: CNC Machine Operator
Answer:

- **Technological process:** Processing parts (cutting, drilling, milling)
- **Technical equipment:** CNC machine, motors, machine components
- **Control tools:** Keyboard, touchscreen, programming interface
- **Information sources:** Sensor readings, measurements on the screen, signal lights
- **Safety elements:** Protective cover, emergency stop button, hazard zone indicators

✅Test Questions with Answers

1. What is the main task of an operator?
   A) Selling products
   B) Repairing equipment
   C) Controlling and monitoring the technological process ✅
   D) Managing warehouse inventory

2. Which of the following is NOT part of the psychological structure of an operator’s work?
   A) Attention
   B) Memory
   C) Physical strength ✓
   D) Thinking
3. Which psychological factor directly affects decision-making in operator activity?
   A) Free time
   B) Seasonal work
   C) Stress resistance ✓
   D) Financial situation
4. What is the main source of information for an operator?
   A) Worker’s notebook
   B) Sensors and indicators ✓
   C) Schedule chart
   D) Oral information by phone
5. Why is decision-making important in operator activity?
   A) To give instructions to workers
   B) To monitor employees
   C) To respond quickly to system changes ✓
   D) To prepare documents
6. Which senses are most used by the operator?
   A) Taste and smell
   B) Sight and hearing ✓
   C) Handwork and walking
   D) Speaking and writing
7. Why is psychological readiness important for the operator?
   A) To choose work clothing correctly
   B) To solve urgent problems and handle stress ✓
   C) To schedule rest time
   D) To repair equipment
8. What creates the greatest mental load in operator activity?
   A) Planning work
   B) Continuous signals and alerts ✓
   C) Excess free time
   D) Notifications about product quality
9. What is meant by the operator’s sensory activity?
   A) Sequence of thoughts
   B) Equipment repair
   C) Receiving information through sight and hearing ✓
   D) Copying documents
10. Which of the following may be a source of stress in operator activity?
   A) Communication with friends
   B) Easy-to-understand interface

C) Continuous alarms and responsibility ✓
D) Many days off

◆ Task 1: Analyze Main Operator Activities

Task: Determine which operator function each activity belongs to:

Activity Description	Operator Function
Monitoring temperature via sensors	Process monitoring
Adjusting parameters on the control panel	Process control
Recording based on workflow chart	Documentation and record-keeping
Checking product quality	Quality control
Stopping equipment during alarm	Ensuring safety

◆ Task 2: Match Psychological Elements to Real Work Situations

Activity Description	Psychological Element
Responding quickly to a danger signal	Quick decision-making
Continuously monitoring indicators	Attention (concentration)
Remembering workflow order	Memory
Analyzing cause of technological change	Thinking
Maintaining focus in a noisy environment	Stress tolerance + attention

◆ Task 3: Operator Actions in Emergency Situation. Scenario: **Pressure exceeds limit in a thermal furnace, and a sensor triggers an alarm.**

Psychological and practical actions:

1. **Perceive the signal** — Identify the situation via visual or audible alarms (senses at work).
2. **Assess the situation** — Quickly analyze readings (thinking + analysis).
3. **Make rapid decisions** — Command the control panel to stop the furnace or reduce pressure.
4. **Ensure safety** — Press emergency stop if danger is high.
5. **Document** — Record the incident and inform supervisor or technical service.
6. **Maintain stress tolerance** — Act calmly and systematically, avoiding panic.

✓TASK 4: Analyze the operator's psychological workload in the following situation

Situation: The operator works alone on a 12-hour night shift. System information is updated every 10 minutes. If a signal occurs, the operator must respond immediately.

Question: Which psychological factors are strongly activated?

Answer:

- **Attention:** It is necessary to maintain focus on a continuous, slowly changing information flow.
- **Memory:** The operator must remember the sequence of processes, response actions, and parameters.
- **Thinking:** Quick analysis of the causes and consequences of malfunctions is required.
- **Stress resistance:** Solitude, night shift, and high responsibility increase psychological pressure.
- **Quick decision-making:** Timely response to each signal is crucial.

Topic 5: Professional Motivation

Outline:

1. Professional motive and motivation. Classification of work motives.
2. Motivations in labor activity. Career choice motives. Motivation for choosing an engineering profession. Issues of motivation management.
3. Understanding the formation of professional motives from a scientific perspective.
4. Biogenetic and sociogenetic theories of personality. Personal activity.
5. Stages of professional development.

Professional motive and motivation:
The term *motive* comes from the Latin word *movere*, meaning “the reason for movement.” Professional motives are internal and external reasons that encourage a person to engage in professional activity and continue it.

A **professional motive** is an internal psychological factor expressing a person’s interest in a particular profession or type of work and the need to gain satisfaction from performing it. This motive influences a person’s professional activity, choice of career, and development.

Example: A person who aspires to become a teacher has a professional motive in the "desire to impart knowledge to others."

Motivation is the set of internal and external factors that stimulate a person to engage in a specific activity.

Types of motivation:

- **Intrinsic motivation:** Interest in the activity itself (e.g., love for the profession).
  Example: A teacher who loves their work cares about each student's learning and enjoys seeing their development. This intrinsic motivation drives persistence and willingness to innovate even in complex situations.
- **Extrinsic motivation:** Material or social rewards, recognition, salary.
  Example: An accountant working in a company with high salary and bonus system strives to increase monthly performance indicators. This is an example of extrinsic motivation.

Formation and development of professional motivation: Professional motivation begins in childhood and develops through education and life experiences. It depends on factors such as:

- Family environment
- School and educational processes
- Influence of teachers
- Personal interests and abilities
- Prestige of the profession in society

Interest in work and internal factors:

Interest in a profession is one of the key guarantees of successful activity. Internal factors are expressed through a person's values, desires, abilities, and goals.

Personality and motivation:

Professional motivation ensures the individual's professional development by:

- Acquiring knowledge
- Developing skills
- Cultivating a sense of responsibility
- Striving to become a competent specialist

Personal qualities such as responsibility, diligence, initiative, and discipline are closely linked with motivation.

Importance and benefits of professional motivation: Well-developed professional motivation:

- Increases labor productivity
- Encourages creativity in approach
- Reduces stress and fatigue
- Improves the overall organizational environment
- Stimulates personal development

Conclusion: Professional motive and motivation play a crucial role in every person's life. A motivated individual approaches work responsibly, strives for continuous improvement, and becomes an effective and fulfilled professional. Therefore, education systems and society should focus on developing professional motivation.

Classification of work motives:

1. Concept of work motive:

A work motive is an internal or external factor that encourages a person to engage in labor activity and affects their attitude toward work. Work motives directly influence career choice, attitude to work, and job performance.

2. Importance of work motives:

Work motives:

- Determine the activity of employees
- Increase labor productivity
- Contribute to organizational and social development
- Promote social progress
- Support personal development and self-understanding

3. Types of work motives:

A. Internal vs. external motives (by source):

Internal motives	External motives
Satisfaction from work	Salary, reward
Demonstrating ability	External supervision
Creative exploration	Competition, recognition
Love for the profession	Punishment or threat

B. Material vs. non-material motives (by content):

Material motives	Non-material motives
Salary, bonus, reward	Recognition, moral encouragement
Working conditions, benefits	Status in a group
Pension, material guarantees	Opportunities for development

C. Personal vs. social motives (by purpose):

Personal motives	Social motives
Self-expression	Contributing to the team

Personal motives	Social motives
Personal development	Achieving status in society
Career advancement	Service to the country

D. Positive vs. negative motives (by emotional influence):

Positive motives	Negative motives
Desire for reward	Fear of punishment
Desire for recognition	Fear of unemployment
Interest in work	Avoidance of lawbreaking

4. Intrinsic and Extrinsic Motives: In-Depth Analysis

Intrinsic motives are related to a person's personal values, interests, and aspirations. They are stable, long-term, and produce positive results. Examples include:

- Loving one's work
- Engaging in creative activities
- Working on personal development

Extrinsic motives drive a person to act under the influence of the external environment. Examples include:

- Salary
- Competition
- Supervision by a manager

In a well-organized work environment, intrinsic and extrinsic motives complement each other and lead to higher productivity.

5. Practical Examples and Analysis

- **Teacher:** Intrinsic motive — desire to educate children; Extrinsic motive — salary, vacation days.
- **Doctor:** Intrinsic motive — desire to heal people; Extrinsic motive — prestige and financial incentives.
- **Worker:** Intrinsic motive — personal growth through work experience; Extrinsic motive — salary and social guarantees.

Conclusion: Work motives are one of the main factors guiding human activity. When properly developed, they lead to satisfaction, high performance, and contribute to social and economic development depending on how effectively incentives are directed.

2. Motivations in Labor Activity

1. Concept of labor activity and motives:
Labor activity refers to any work or professional actions a person performs to achieve specific goals. It plays a crucial role in life, as labor provides both material and moral satisfaction.

Motivation is the internal and external forces that guide this activity, i.e., factors that prompt a person to act.

2. What are labor activity motives?
Labor activity motives are the reasons and factors that encourage a person to work and perform professional tasks. They influence one's attitude to work, efficiency, and professional development.

3. Types of labor activity motives:
Labor activity motives can take various forms, mainly grouped as follows:

3.1 Intrinsic motives:
Intrinsic motives are based on personal interests, professional aspirations, and satisfaction derived from work. Examples:

- Demonstrating ability and competence
- Striving for professional development
- Satisfaction from the work process

3.2 Extrinsic motives:
Extrinsic motives consist of material and social incentives that drive a person under external influences. Examples:

- Salary and bonuses
- Recognition and praise
- Opportunities for career advancement

3.3 Material and non-material motives:
- **Material:** salary, rewards, social guarantees
- **Non-material:** recognition, leadership, status within a team

4. Role of intrinsic and extrinsic motives:
Intrinsic and extrinsic motives should interact. Relying solely on extrinsic incentives (e.g., salary) may reduce a person's interest in work. Intrinsic motives are stable and long-term. Conversely, extrinsic motives strengthen work performance when intrinsic motives are weak.

5. Methods to strengthen labor motives:
- Improve working conditions
- Organize reward and incentive systems properly
- Provide opportunities for personal development

- Offer moral incentives to enhance productivity
- Consider employees' ideas and suggestions

6. Conclusion:

Labor activity motives are key factors motivating professional work. When intrinsic and extrinsic motives are aligned, they lead to high performance. Organizations and managers can increase productivity by directing motivation effectively.

Career Choice Motives

1. Definition:

Career choice is the process of selecting a professional path that aligns with a person's abilities, interests, and social needs. It is a critical life decision affecting future development and personal growth.

2. What are career choice motives?

Career choice motives are factors that push a person to select a particular profession or type of work. They depend on personal needs, values, and social environment.

3. Types of career choice motives:

3.1 Intrinsic motives:

- **Interest and passion:** A person approaches a profession or activity with internal curiosity and enthusiasm.
- **Ability and potential:** The profession should match the person's skills and abilities.
- **Aspiration for personal development:** Choosing a career to gain new knowledge and self-improvement.

3.2 Extrinsic motives:

- **Material incentives:** salary, social benefits, bonuses
- **Family and social pressure:** Influence from family members, close people, or society regarding education and career choice
- **Social prestige and status:** Some professions have high societal status, motivating a person to choose them

4. Importance of intrinsic and extrinsic motives:

Intrinsic motives are fundamental and stable, based on personal desire and interests. Extrinsic motives are influenced by external factors, such as economic or social conditions. The best results are achieved when intrinsic and extrinsic motives are combined.

5. Psychological factors in career choice:

- **Personal interests:** What a person enjoys is crucial in career selection
- **Ability and potential:** Knowledge and skills must match the chosen profession
- **Social environment:** Family, school, friends, and public opinion influence career choice
- **Childhood dreams and expectations:** Early life aspirations often guide career decisions
- **Economic situation:** Economic conditions and market demand also play a significant role

6. Conclusion:

Career choice is a critical and responsible decision in a person's life, shaped by intrinsic and extrinsic motives. Choosing the right career ensures satisfaction, professional growth, and opportunities for social and economic success. Therefore, personal interests, abilities, and societal needs must be considered when making career decisions.

Motives for Choosing an Engineering Career and Motivation Management Issues

Engineering Profession and Its Importance. The engineering profession is related to finding new solutions, creating innovations, and solving complex technical problems in technology, construction, industry, and other fields. Engineers play a vital role in the development of society, and their work contributes to economic growth and technological advancement.

Motives for Choosing an Engineering Career

Intrinsic motives:

- **Interest in technology and innovation:** Engineering is a creative and technology-based field. Developing new solutions in this area is intellectually stimulating.
- **Desire to solve complex problems:** Engineers analyze problems and work on finding effective solutions.
- **Personal development and professional growth:** Continuous improvement of knowledge and skills is required in engineering.
- **Love for creativity and innovation:** Contributing to society by developing new technologies and methods.

Extrinsic motives:

- **Economic stability and rewards:** Engineering careers usually offer high salaries and social guarantees.
- **Prestige and recognition in society:** Engineers often enjoy respect and attention in society.
- **Job stability:** There are many employment opportunities in engineering.
- **Career and advancement opportunities:** Opportunities for promotions and involvement in scientific or leadership activities.

Why Engineering Requires High Motivation

- Solving technical problems requires attention and discipline.
- Continuous interest and effort are needed to learn and implement new technologies.
- A creative approach and sense of responsibility help strengthen motivation.

Key Issues in Motivation Management

Motivating engineers requires attention to the following issues:

1. **Considering individual motivation:** Each engineer has unique personal interests and needs.

2. **Aligning intrinsic and extrinsic motivation:** Relying solely on material incentives is less effective.
3. **Improving working conditions:** The work environment and team dynamics affect motivation.
4. **Providing opportunities for professional development and skill enhancement.**
5. **Establishing recognition and reward systems.**

Methods to Strengthen Motivation in Engineering

- Properly distribute salaries and material incentives.
- Provide opportunities for creative and professional development.
- Maintain good relationships with team members and management.
- Recognize and reward professional achievements.
- Optimize working conditions.
- Increase the meaningfulness and importance of the work.

Conclusion. Engineering is a crucial and responsible profession for societal development. Choosing this career requires alignment of intrinsic interests and extrinsic incentives. Proper management of engineers' motivation can enhance their productivity. Therefore, leaders and organizations should focus on actively and appropriately directing motivation.

Motivation Management. Motivation management is the process of increasing employees' interest in their work, directing their actions toward goals, and enhancing efficiency. The aim is to align internal and external incentives and maintain continuous engagement.

Key Issues in Motivation Management

1. **Considering individual employee motivation:**
    - Each employee has unique motivators, needs, and interests.
    - Some value material incentives, while others prioritize recognition and attention.
    - Leaders and HR should study and consider personal motivational factors.
    - Focus areas: personal goals, professional development needs, emotional and social needs.
2. **Aligning intrinsic and extrinsic motivation:**
    - **Intrinsic motivation:** personal satisfaction, interest, and aspirations in work.
    - **Extrinsic motivation:** salary, bonuses, recognition, and other material or non-material incentives.
    - Relying solely on extrinsic motivation may result in short-term and unstable engagement. Leaders must create conditions to enhance intrinsic motivation.

3. **Organizing an effective motivation system:**
    - Reward systems should be clear and fair.
    - Motivation tools must increase employee productivity.
    - Recognition and rewards are effective for achieving goals.
    - Workplace issues and conflicts should not negatively affect motivation.
4. **Professional development and education:**
    - Opportunities for skill improvement and career growth are key motivational factors.
    - Organizations should organize ongoing training, seminars, and courses.
    - Learning innovations and new methods strengthens motivation and engagement.
5. **Improving working conditions:**
    - Modern technologies, a comfortable workplace, and flexible schedules improve productivity and satisfaction.
    - Strict adherence to health and safety standards.
    - Enhancing teamwork and establishing constructive relations between management and employees.
6. **Recognition and reward of employees:**
    - Each employee's achievements and efforts should be acknowledged.
    - Praise, certificates, awards, or public recognition enhance motivation.
    - Align group and individual reward systems effectively.
7. **Individualizing and continuously monitoring motivation:**
    - Regularly assess motivation levels (via surveys and interviews).
    - Develop personalized motivation plans for each employee.
    - Adjust motivation methods and introduce new incentives when necessary.

Conclusion. ***Motivation management is crucial for organizational success and employee engagement. Key issues include understanding individual needs, aligning intrinsic and extrinsic motivation, creating an effective system, and providing opportunities for professional growth. Properly addressing these issues improves productivity and ensures sustainable organizational development.***

3. Formation of Professional Motivation: Scientific Understanding

Concept of Professional Motivation. **An individual's attitude toward work and their productivity depends on their professional motivation. For example, a worker who enjoys their job and feels opportunities for personal growth is likely to achieve precise results on time. Therefore, developing professional motivation is a necessary condition for an employee's success in their career.**

Importance of Professional Motivation

1. **Work Efficiency:** Strong professional motivation increases productivity. Employees with low motivation may quickly become fatigued or lose interest in their work.
2. **Professional Growth and Development:** Motivated employees strive to improve their skills and acquire new knowledge.
3. **Job Loyalty and Stability:** Strong motivation helps employees remain in their positions longer and contributes to stability within the team.
4. **Team Spirit and Culture:** Professional motivation improves collaboration and creates a positive work environment.

Factors Influencing Professional Motivation

- **Personal factors:** Employee's attitude toward the profession, interests, goals, and abilities.
- **Socio-cultural factors:** Societal attitudes toward the profession, influence of family and friends.
- **Working conditions:** Workplace environment, safety, and positive team atmosphere.
- **Material incentives:** Salary, bonuses, awards, and privileges.
- **Psychological incentives:** Recognition, respect, and opportunities for self-development.

Methods for Developing Professional Motivation

1. **Defining professional goals and directions:** Assign tasks aligned with employees' interests and goals.
2. **Educational and training activities:** Conduct seminars, training, and motivational talks to foster professional aspirations.
3. **External incentives:** Establish reward systems, bonuses, and public recognition.
4. **Improving working conditions:** Provide a comfortable work environment and social guarantees.

5. **Psychological support:** Offer mentorship, counseling, and team training sessions.

Conclusion: Developing professional motivation is not only a theoretical concept but also a practical process. By harmonizing intrinsic and extrinsic motivations and considering individual employee traits, organizations can achieve higher professional success.

Attention and Psychology in Professional Activities

Concept of Attention. Attention is the concentration of consciousness on a specific object or activity for a certain period. Through attention, people remember only important and significant information.

Key Characteristics of Attention:

- **Span:** The number of objects that can be focused on simultaneously.
- **Stability:** Ability to maintain focus on one object over time.
- **Intensity:** The degree of conscious and strong focus on an object.
- **Distribution:** The ability to divide attention among multiple activities simultaneously.
- **Shiftability:** The ability to quickly and easily switch attention from one object to another.

Types of Attention

1. **Involuntary (Automatic) Attention:** Occurs without willpower, triggered by external or internal stimuli.
2. **Voluntary (Intentional) Attention:** Conscious and goal-oriented focus that requires effort.
3. **Post-voluntary Attention (Interest-based):** Initially requires effort, but continues naturally due to interest; the most effective type of attention.

Methods to Develop Attention

- Plan daily tasks and adhere to the schedule.
- Practice self-control to regain focus when distracted.
- Perform exercises designed to strengthen attention.
- Minimize external distractions: phones, noise, unnecessary people.
- Increase engagement and interest in activities to enhance focus.

Development and Characteristics of Attention in Individuals

Concept of Personal Attention

Attention is a conscious mental process that manifests according to an individual's personal traits, behavior, and interests. Attention is not innate but develops gradually through education and experience. This development occurs in stages:

1. **Childhood (3–6 years):** Attention is mostly involuntary. Children focus on bright, noisy, or moving objects.
   🔎 *Example:* Children watching cartoons are fully absorbed and difficult to distract.
2. **School Age (7–12 years):** Attention becomes voluntary. Children begin learning to control their focus.
   🔎 *Example:* A student listens to a teacher and simultaneously writes in a notebook.
3. **Adolescence and Youth (13–25 years):** Attention reaches a high level of development. Strong voluntary attention emerges.
   🔎 *Example:* A student preparing for an exam maintains concentrated, organized, and strong attention.
4. **Adulthood (25+ years):** Attention develops depending on professional activity. Specialists can actively manage their attention.
   🔎 *Example:* Pilots, doctors, or engineers maintain high levels of attention during work.

Factors Influencing Attention

Internal Factors:

- Willpower
- Interests
- Motivation
- Physical health
- Emotional state

External Factors:

- Environmental noise
- Light, air, colors
- Influence of others

  🔎 *Example:* Lessons explained in an engaging way capture attention, while boring classes disperse it.

Methods to Develop Attention

1. Structured work: Create a daily schedule.
2. Interesting activities: Increase motivation and engagement.
3. Positive environment: Quiet, well-lit, and comfortable spaces.
4. Special exercises: e.g., "Find the Errors" games, memory exercises, distinguishing red and blue dots.
   🔎 *Example:* In Japanese schools, children regularly practice attention exercises to systematically improve focus.

Illustrative Examples

- 🎯 *Example 1:* A student preparing for an exam follows a schedule, studies for 25 minutes, and rests for 5 minutes, demonstrating strong voluntary attention.
- 🎯 *Example 2:* A child stops to watch birds in a park, showing involuntary attention.

- 🎯 *Example 3:* A chess player observes the opponent's moves, facial expressions, and time, showing divided and sustained attention.

Conclusion: Attention is an integral part of human activity, essential for learning, work, and success. Different types of attention (involuntary, voluntary, and post-voluntary) manifest in various situations. Attention requires effort, and strong attention can be developed through education and practice.

Attention Requirements for Engineers

Engineering is a complex, technical, and responsible profession that requires not only theoretical knowledge but also high levels of attention, reasoning, memory, communication, and emotional stability. Engineers design projects, test technical devices, identify and solve problems, and are responsible for accuracy and safety. Therefore, attention is a key factor in professional efficiency.

Importance of Attention in Engineering

- Managing multi-step technical processes
- Working with numbers and formulas
- Requiring precision, accuracy, and quick decision-making
- Avoiding mistakes
- Paying attention to every detail

Attention is not only useful but essential for professional survival and effectiveness.

Key Attention Requirements for Engineers

1. **Stability:** Ability to focus on an activity for long periods.
   🔎 *Example:* A power engineer monitors turbine operation for 4–5 hours.
2. **Intensity:** Maintaining focus under high responsibility or hazardous conditions.
   🔎 *Example:* An electrical engineer inspects high-voltage equipment without losing focus.
3. **Distribution:** Monitoring multiple processes simultaneously.
   🔎 *Example:* A plant engineer observes temperature, pressure, and automated equipment at the same time.
4. **Shiftability:** Quickly and effectively switching focus between tasks.
   🔎 *Example:* A computer engineer answers a technical question while troubleshooting a program error.
5. **Accuracy:** Focusing on details, small differences, and malfunctions.
   🔎 *Example:* A design engineer detects millimeter-level errors in a drawing.

Scientific Analysis: Attention and Professional Suitability

In psychology, the ability to meet professional requirements is described as "professional compatibility." The level and type of attention are decisive factors in determining an engineer's suitability.

- **Low attention:** Errors, fatigue, stress, and risky situations.

- **High attention:** Precision, responsible decision-making, quality outcomes, and safe work.

Methods to Develop Engineers' Attention

1. Exercises: Logical problems, memory games, and "find the difference" tasks.
2. Structured work: Large projects divided into smaller tasks for focused attention.
3. Technological tools: Automated signaling systems to direct focus.
4. Minimizing distractions: Quiet, well-lit, and comfortable workplace.
5. Proper rest: Mitigating fatigue from prolonged periods of intense attention.

6. Summary Through Examples

Engineering Field	Type of Attention	Required Skill/Requirement
Electrical Engineer	Stability + Intensity	Working for long periods with hazardous equipment
IT Engineer	Distribution + Accuracy	Managing coding and system monitoring simultaneously
Construction Engineer	Shiftability + Accuracy	Checking projects, identifying details, detecting and resolving faults quickly
Industrial Engineer	Distribution + Stability	Monitoring multiple production lines while maintaining balance

✅**Conclusion:** Engineering requires not only knowledge and skills but also psychological stability and high levels of attention. Even minor lapses in attention in any technical work can lead to serious consequences. Therefore, engineers should develop attention that is:

- Stable
- Accurate
- Willpower-based
- Distributable
- Rapidly shiftable

These abilities develop through training, knowledge, and practical experience.

II. Perception in Professional Activity

Concept and Essence of Perception

Perception is the conscious process of receiving objects and events in the environment as a whole, taking into account their characteristics (shape, color, sound, taste, movement). It is the process by which humans gather information through sensory organs and create a complete mental representation.
🔎 *Example:* Observing a teapot, you perceive its shape, color, material, and temperature simultaneously — this is perception.

Role of Perception in Professional Activity

Perception is a central cognitive process in all professions — from engineering and medicine to teaching, design, and driving — because it is necessary for:

- Accurate evaluation of objects and environment
- Detecting signals and signs
- Rapid understanding of situations
- Forming the basis for decision-making

Without perception:

- Problems in the environment go unnoticed
- Errors are not detected
- Comprehension slows down

Scientific Basis: In psychology, perception is the starting point of cognitive processes; all knowledge, decisions, and actions originate from perception.

Characteristics of Perception

1. **Wholeness (Integrity):** Perception captures the complete image, not just individual features.
   🔎 *Example:* An engineer listening to a machine engine perceives whether it is functioning correctly or has a malfunction.
2. **Meaningfulness:** Perception is interpreted based on prior experience.
   🔎 *Example:* An agricultural specialist assesses soil fertility by its appearance.
3. **Structurality:** Elements of perception are interconnected, forming a unified system.
   🔎 *Example:* A programmer identifies errors in complex code by understanding the overall structure rather than single lines.
4. **Constancy:** Objects are perceived consistently under different conditions (light, distance).

🔎 *Example:* A driver estimates the size of a car correctly in various situations.

5. **Selectivity:** Important objects are prioritized while irrelevant information is ignored.
   🔎 *Example:* A dispatcher immediately notices an important radio signal, ignoring other noise.

Perception and Professional Orientation . **Professional orientation involves guiding individuals to choose professions based on their abilities, interests, and psychological potential. Perception plays two roles here:**

1. **Self-perception (self-awareness):** Correct assessment of one's strengths, abilities, and interests is crucial for career choice.
   🔎 *Example:* A student with good perception in chemistry may choose medicine or chemistry as a career.
2. **Required perception for the profession:** Each profession requires specific perceptual skills:

Profession	Required Perceptual Skill
Driver	Perception of speed, distance, and movement
Engineer	Complete perception of technical forms and structures
Doctor	Evaluating patient condition through external signs
Designer	Ability to perceive color, shape, and balance

Importance of Perception in Career Choice

If an individual is unaware of their perceptual abilities:

- They may choose the wrong profession
- They may struggle at work and make errors
- Interest may decline

If perception matches professional requirements:

- Faster learning
- Less fatigue
- Higher performance
- Greater professional satisfaction

Examples:

- 🎓 *Artist:* Perceives small details and color balance; imagination is strong, guiding them toward art. In another field (e.g., accounting), they may struggle.
- 🏗️ *Engineer:* Uses structural perception to visualize complex objects from simple diagrams.
- ⚕ *Doctor:* Experienced doctor evaluates a patient's condition by observing their face. This demonstrates perception strengthened by professional experience.

✅**Conclusion:**

- Perception is one of the most important cognitive processes in professional activity.
- An individual's perception is directly linked to their professional interest and choice.
- Each profession demands specific perceptual skills.
- Studying and developing perception can lead to professional success.

3. Apperception: Perception of Time, Motion, and Space. Requirements for Engineer's Perception. Constancy of Perception. Understanding Perceptual Principles in Career Guidance

Concept of Apperception. Apperception is the process by which a person interprets, understands, and makes sense of information. It is subjective and depends on an individual's personal experience, knowledge, emotions, beliefs, and thinking style. The concept was first introduced by German philosopher G.W. Leibniz and later developed by I. Kant and W. Wundt.

Types of Apperception Based on the Mode of Perception:

- **Stable (constant) apperception:** Interpreting information based on well-formed, stable views and worldview.
- **Situational (seasonal) apperception:** Perception changes depending on emotional state or external conditions.
- **Personal apperception:** Interpretation based on individual experiences.
- **Social apperception:** How a person perceives others, groups, and social interactions.

Difference Between Perception and Apperception

Perception	Apperception
Process of sensing and receiving external information	Conscious processing, evaluation, and interpretation of received information
Universal physiological process in	Individually manifested in each person

Perception	Apperception
all humans	
Example: Hearing a sound	Interpreting that sound as “danger” — a result of apperception

In education, apperception determines how a student assimilates new knowledge. When new information connects with prior knowledge and experience, it is learned faster and more deeply. Apperception plays an active role in personal development, shaping beliefs, behavior, and decision-making.

Conclusion: Apperception is the mental process of processing information. It is crucial not only for learning but also for personal relationships and everyday decision-making. Studying it allows us to better understand human worldview and cognitive processes.

Perception of Time, Motion, and Space. Perception is the process of understanding objects and events as whole entities via sensory organs.

Example: Hearing music is sensation, but understanding its melody, rhythm, and content is perception.

Perception of Space:
Space refers to the position of objects in width, length, and height.

- Example: Two identical cubes — one in front, one behind. The one behind appears smaller. This illustrates spatial perception.

Perception of Motion:
Motion is the change in position of an object over time and space.

- Example: Observing a running person, we understand their speed, direction, and goal. Vision receptors detect changes in position.

Perception of Time:
Time reflects the continuity and sequence of events.

- Example: A 45-minute lesson may feel like 15 minutes if engaging.
  Factors influencing time perception:
- **Emotional state:** Time passes quickly in enjoyable situations; slowly when bored or stressed.
  - Example: During an exam, 10 minutes may feel very short.
- **Type of activity:** Active activities make time pass faster.
  - Example: During a sports game, 1 hour feels shorter.
- **Age:** Children perceive time as longer; adults perceive it as shorter.

- Example: Waiting for a month for New Year feels long for children, short for adults.

Interrelation of Time, Motion, and Space:
These three concepts are inseparable. Every movement occurs at a specific time and in a specific space.

- Example: A football player controls the ball in space (field), at a certain time (during play), through motion (kick, run). Understanding this relationship helps adapt to the environment.

Conclusion: Perception of time, motion, and space is a fundamental cognitive mechanism. Its clarity affects the effectiveness of human activity. Pilots, drivers, athletes, and military personnel must master these forms of perception.

Requirements for Engineer's Perception and Perceptual Constancy. Perception is the ability to sense external objects and represent them as a coherent whole in the mind. In engineering, perception is a vital cognitive skill that enables understanding and analyzing complex systems, assessing distance, shape, time, and motion accurately. An engineer must have correct and stable perceptual abilities.

Key Requirements for Engineer's Perception:

1. **Accuracy and correctness:** Engineers must perceive devices, diagrams, or objects as they truly are.
   - Example: An engineer analyzing a drawing must detect a 0.5 mm difference without error.
2. **Spatial perception (3D perception):** Ability to understand size, shape, and placement.
   - Example: An architect or mechanical engineer visualizes a 3D model from a 2D drawing.
3. **Correct perception of time and motion:** Understanding sequence and timing of processes.
   - Example: An electrical engineer evaluates current delay in milliseconds.
4. **Differentiation of important vs. irrelevant aspects:** Identifying key information amid temporary noise or visual distractions.
   - Example: Distinguishing hazardous signals from flashing lights on a panel.
5. **Dynamic perception:** Observing and analyzing moving objects.
   - Example: A robotics engineer must react quickly to moving mechanisms.
6. **Concentration and sustained attention:** Technical processes require prolonged focus for accurate reasoning.

Perceptual Constancy. Perceptual constancy is the ability to maintain stable perception of an object's physical characteristics (shape, size, color, weight, etc.) despite changing conditions.

Types and Examples of Constancy:

- **Shape constancy:** Perceiving shape correctly despite angle or distance.
  - Example: A thin circle tilted at 45° is still perceived as a circle.
- **Size constancy:** Object appears smaller at a distance, but perceived size remains the same.
  - Example: A distant car appears smaller but is understood to be full-sized.
- **Color constancy:** Color is perceived the same despite lighting changes.
  - Example: A red pen appears red even in shadow.
- **Design constancy:** Computer graphics are recognized even if screen size changes.
  - Example: A CAD model remains recognizable when zoomed out.

Importance for Engineers:

- Reduces errors in evaluating distance, shape, color, and placement.
- Ensures accuracy when working with machines or systems.
- Facilitates effective design and modeling.

Conclusion: An engineer's perceptual ability must be highly developed. Accuracy, attentional stability, and perceptual constancy are critical for professional activity. Constancy protects engineers from misjudgments and improves product quality.

Considering Perceptual Laws in Career Guidance. Career choice is one of the most important life decisions. Along with abilities, interests, and personality traits, perceptual characteristics and laws must be considered.

Perception in Professional Activity: Perception allows understanding and processing external objects and events. Each profession requires specific forms or levels of perception.

Key Perceptual Principles and Their Professional Impact:

1. **Principle of Wholeness (Gestalt):** Objects and events are perceived as a whole.
   - Career relevance: Professions requiring understanding of entire systems.
   - Examples: Designer (overall layout), Project engineer (system functioning).
2. **Figure-Ground Separation:** Focusing attention on central objects and separating them from background.
   - Career relevance: Identifying key information amid signals.

    - Examples: Radar operator, Radiologist.
3. **Perceptual Constancy:** Recognizing objects correctly despite changes in shape, size, or color.
    - Career relevance: Accurate identification in any condition.
    - Examples: Auto mechanic, Architect.
4. **Role of Inheritance and Experience:** Perception depends on personal experience, knowledge, and cognitive activity. Education and practice enhance perceptual level, leading to professional efficiency.
    - Example: Experienced engineer quickly detects flaws.

Types of Perception and Corresponding Professions:

Type of Perception	Definition	Example Professions
Visual	Perceived through sight	Painter, Designer, Astronomer, Radiologist
Auditory	Perceived through hearing	Musician, Linguist, Audio engineer
Tactile/Kinesthetic	Perceived by touch and movement	Surgeon, Masseuse, Coach
Spatial	Perception of distance, size, shape	Architect, Engineer, Driver
Temporal (time)	Perception of time, rhythm, sequence	Composer, Air traffic controller, Athlete

Methods for Assessing Perception in Career Guidance:

1. Psychological tests and diagnostics (visual, spatial perception tests, figure recognition, speed estimation).
2. Observation during practice (ability to extract information in complex environments).
3. Simulators and training tools (VR/AR in aviation, medicine, and manufacturing).

Benefits of Considering Perception in Career Choice:

- Selecting a profession aligned with abilities for full potential expression.
- Enhancing work efficiency through psychological compatibility.
- Professional satisfaction and motivation.
- Career success and steady development.

Conclusion: Career guidance should consider not only interests and academic achievements but also perceptual characteristics and principles. Assessing perception properly ensures optimal professional orientation, benefiting both the individual and society.

Topic 7. Psychological Description of Engineers' Cognitive Activity

Outline:

1. Labor activity and memory. Personal experience and memory. Types and processes of memory. Conditions for retention.
2. Considering memory laws in vocational guidance.
3. Thinking and mastering a profession. Forms, types, and operations of thinking.
4. Individual characteristics of thinking. Role of thinking in mastering engineering. Flexibility of operators' thinking and its assessment. Practical thinking in operators' work.

1. Labor Activity and Memory. Labor activity **is a set of purposeful actions performed by a person during work, consisting of practical movements necessary to complete a labor task. In any labor activity, the following psychological factors are manifested:**

- **Goal setting** – determines the direction of action.
- **Motivation** – drives the execution of the action.
- **Perception and attention** – ensure the management and control of the action.
- **Memory** – allows retaining and reusing methods of action.

Labor actions usually need to be repeated over a long period until they become automated. During this process, **psychomotor skills** and **automaticity** are developed.

Stages of forming labor actions:

1. **Perception and comprehension stage** – the person understands the labor task and learns how to perform it.
2. **Formation through experience stage** – correct motor skills are formed as a result of repeated execution of the action.
3. **Automation stage** – the action is performed unconsciously, as a "habit."

Automated actions increase labor efficiency and allow a person to focus attention on other tasks.

Importance of memory in labor activity

Memory is the process of recalling, storing, and reconstructing previous experience. In labor activity, memory performs the following functions:

- Retains the sequence of actions.
- Allows reuse of skills and competencies.
- Ensures quick and accurate execution of tasks.
- Facilitates learning new methods of action.

Memory and attention work interdependently. For example, the precise and rapid actions of an operator, driver, tailor, or locksmith depend on well-developed **motor memory**.

Types of memory and their role in labor

Memory type	Definition	Role in labor
Short-term memory	Stores information for a short time	Helps perform temporary tasks
Long-term memory	Retains information for a long time	Preserves skills and competencies
Motor memory	Stores sequences of actions	Ensures automated labor actions
Emotional memory	Linked to emotions	Shapes motivation and attitude toward work
Logical (verbal) memory	Stores words and concepts	Important in creative and intellectual labor

Methods to improve memory for labor efficiency

1. Repetition and practice – perform each action multiple times.
2. Understanding and logical connections – learn the material meaningfully.
3. Visualization and association – link actions with images.
4. Focused attention – avoid distractions.
5. Rest and relaxation – fatigue weakens memory.

Conclusion:

Labor activity and memory are inseparable. Correct formation of actions and effective use of memory increase productivity and develop skills. Therefore, labor psychology emphasizes memory development and automation of actions.

Personal Experience and Its Psychological Essence

Personal experience is the accumulation of knowledge, skills, emotions, and memories throughout a person's life. It shapes one's worldview, habits, thinking, and behavior. Personal experience develops not only through cognition but also through feelings, comprehension, and practical activity.

Example:

A child who learns to ride a bicycle retains this skill as part of personal experience. A student's study method for exams may later become their personal learning strategy. Personal experience is an individual life school, unique to each person.

2. The Role of Memory in Personal Experience

Memory is the main mental process for storing and reconstructing personal experience. Without memory, a person would have to learn everything anew each time. Memory supports personal experience by:

- Preserving information (past events and knowledge).
- Reusing experience for new decisions.
- Enabling self-identification ("Who am I?").

Example:

If someone is very nervous giving a speech for the first time, they can learn to

manage themselves in the same situation later using memory – this is the preservation of personal experience.

3. Types of Memory and Their Connection to Personal Experience

Memory type	Definition	Example in personal experience
Short-term memory	Stores information for a short time	Temporarily remembering a phone number
Long-term memory	Retains information for a long time	Recalling arithmetic rules learned at school
Emotional memory	Linked to emotions	Remembering first love or fear
Motor memory	Stores methods of action	Riding a bicycle, playing music
Logical (verbal) memory	Stores words, thoughts, and meanings	Remembering a lecture content

Personal experience is enriched precisely through these various forms of memory.

4. Factors shaping personal experience

Personal experience is formed under the influence of the following factors:

1. **Family and environment** – early impressions and behavioral patterns formed in childhood.
   Example: If a child grows up in a caring and loving family environment, they tend to develop a trusting attitude toward other people.
2. **Education and upbringing** – personal experience is enriched through knowledge and skills.
   Example: Skills acquired by a student during practical training become the foundation for their future professional activity.
3. **Communication and social interaction** – through relationships with others, a person comes to understand themselves.
   Example: Teamwork skills develop through experience gained in collective activities.
4. **Emotional states** – strong emotions are firmly retained in memory.
   Example: The feeling of victory or the pain of loss leaves a lifelong impression on a person's mind.

5. Examples and Practical Significance

- **In pedagogy:** If a teacher relies on students' personal experience, the learning process becomes more effective.
  Example: Explaining new material to a student using real-life examples strengthens memory.
- **In professional activity:** An employee improves their performance by remembering past mistakes and avoiding repeating them.
- **In psychotherapy:** By working with personal memories, a person develops self-awareness and restores psychological well-being.

6. Conclusion

Personal experience and memory are among the fundamental pillars of human consciousness. Through memory, experience is preserved, reused, and serves the development of the individual. A person with rich personal experience tends to be successful in life because they are able to draw conclusions from every situation, learn lessons from the past, and consciously build the future.

2. Memory Processes

Memory consists of four main processes:

1. **Encoding (memorization):**
   The process of receiving information and preparing it for storage in consciousness.
   Example: Listening attentively to the teacher during a lesson and writing down the information.
2. **Storage:**
   The process of retaining information in memory for a certain period of time.
   Example: Remembering information learned several days before an exam.
3. **Retrieval (recall):**
   Extracting stored information from memory and using it when needed.
   Example: Recalling memorized information to answer exam questions.
4. **Forgetting:**
   The loss of stored information or the inability to retrieve it.
   Example: Forgetting foreign language words or formulas that have not been used for a long time.

3. Types of Memory and Their Characteristics

Memory is classified according to several main criteria.

1. According to the type of activity:

Type of Memory	Definition	Example
Motor (movement) memory	Retention of movements and motor skills	Riding a bicycle, dance movements
Imagery memory	Memory based on visual, auditory, olfactory, or gustatory sensations	Recognizing a face, remembering music
Logical (verbal) memory	Retention of words, thoughts, and meanings	Memorizing a definition from a lesson
Emotional memory	Memory related to emotions	Remembering feelings of joy or sadness

2. According to duration:

Type of Memory	Duration	Example
Short-term memory	A few seconds or minutes	Temporarily remembering a phone number
Working	Used during	Holding intermediate results during

Type of Memory	Duration	Example
(operational) memory	ongoing activity	calculations
Long-term memory	Days, years, or a lifetime	Remembering native language grammar rules learned at school

4. Conditions and Factors of Effective Memorization. **The effectiveness of memorization depends on the following factors:**

 1. Attention: Concentration is necessary for accurate perception of information.

Example: Students who listen without distractions remember material better.

 2. Logical understanding: Understanding the meaning of information makes memorization easier. **Example:** Understanding the concept behind a formula rather than memorizing it mechanically.

🔁 **3. Repetition:** Repeated practice transfers information into long-term memory.
 Example: Reading a poem several times helps retain it in memory.

🌪 **4. Association:**
Linking new information with prior experience facilitates memorization.
 Example: Remembering the word “sodium” by associating it with “cleaning.”

 5. Psychological and physical state:
Fatigue, stress, and anxiety reduce memory efficiency.
Example: Information memorized late at night may be forgotten by morning.

🎯 **6. Goal orientation:**
When a person understands why they are memorizing information, memory works more effectively.
 Example: Knowledge learned for professional use, not just for exams, is retained longer.

Examples and Practical Importance

- **For students:** Understanding information meaningfully and reviewing it regularly strengthens memory.
- **For teachers:** Explaining lessons using vivid and interesting examples improves retention.
- **In professional activity:** Automated motor memory in operators or drivers increases work efficiency.
- **In sports:** Repeated practice of movements leads to automation.

Conclusion . Memory is one of the most important psychological processes of human consciousness. It preserves experience and knowledge and supports personal development. The effectiveness of memorization is closely linked to attention, understanding, repetition, and motivation. Developing memory is the key to success in education and professional activity.

2. Considering Memory Laws in Career Counseling. **Career counseling (professional guidance)** is the process of helping individuals choose the right profession by considering their abilities, interests, and individual psychological characteristics. A career counselor (psychologist or educator) studies young people's abilities, memory, attention, thinking, temperament, and other traits, and recommends suitable professions accordingly.

 Example: If an applicant has strong auditory memory, they may succeed in linguistics, music, or pedagogy.

2. General Concept of the Laws of Memory. The **laws of memory** are psychological principles that govern the processes of memorization, storage, recall, and forgetting in humans. These laws manifest individually in each person, but there are also general patterns common to everyone.

Law of Memory	Description	Example
Law of meaningful learning	Information learned with understanding is retained longer	Memorizing a formula by understanding its meaning
Law of repetition	Regular repetition strengthens memory	Consistently memorizing words every day
Law of association	New knowledge is remembered better when linked to prior experience	Associating a foreign word with a similar word in the native language
Law of motivation	Strong interest and clear goals increase memory activity	Learning a favorite subject faster
Law of emotional impact	Emotionally charged information is retained longer	It is difficult to forget joyful or sad events
Law of forgetting	Information that is not used gradually fades	A foreign language not practiced for a long time is forgotten

3. The Role of Memory in Determining Professional Orientation

Memory is an important factor that determines a person's professional abilities and skills. Different professions require the dominance of different types of memory.

Profession	Dominant Type of Memory	Explanation
Engineer, programmer	Logical and working memory	Remembering formulas, codes, and calculations
Music teacher, composer	Auditory and emotional memory	Distinguishing and reproducing musical sounds
Designer, architect	Visual memory	Ability to remember shapes and colors
Teacher, actor	Logical and verbal memory	Retaining texts, speech, and definitions
Driver, athlete	Motor memory	Automation of movements and quick reactions

 Example: An actor needs strong verbal memory to memorize roles, while an athlete mainly relies on motor memory.

Methods of Considering Memory Laws in Career Counseling. Career counselors use various methods to analyze memory characteristics:

 1. Psychodiagnostic tests. Tests are used to determine memory capacity, accuracy, and type. **Example:** The "10-word memorization and recall" method is used to assess short-term memory.

🗣 **2. Interviews and questionnaires**
Questions such as "Which subjects or activities are easier for you to remember?" help identify memory type and interests.

🔁 **3. Practical tasks**
Tasks requiring quick memorization and recall are given, based on memory laws.

🎯 **4. Individualized recommendations**
Psychologists recommend suitable professions based on which type of memory is strongest in each individual.

 Examples:

- Young people with strong **visual memory** are advised to pursue design, architecture, or advertising.
- Those with strong **auditory memory** are suited for linguistics, music, or journalism.
- Individuals with developed **motor memory** are likely to succeed in sports, driving, or technical professions.

5. Examples and Practical Application

1. **In pedagogical colleges:**
   Students' memory types are identified and appropriate professional tracks are recommended.
   Example: Students with strong verbal memory are advised to choose primary education programs.
2. **In career guidance centers:**
   Tests based on memory laws are conducted, and young people receive career advice according to the results.
3. **In recruitment processes:**
   HR specialists or psychologists assess candidates' memory characteristics to select suitable positions.
   Example: Positions such as air traffic controller or duty operator require fast, accurate, and long-term memory.

Conclusion. Choosing the right profession without considering the laws of memory is difficult. In career counseling, each individual's memory type, level, and personal characteristics must be carefully studied. This information helps identify professions that match a person's potential, interests, and likelihood of success. **Thus, correctly applying the laws of memory in career counseling is a key factor in unlocking individual potential and ensuring future professional success.**

3. Thinking and Professional Mastery

Forms, Types, and Operations of Thinking

Thinking is the process through which a person reflects reality in the mind, analyzes it, and draws conclusions. Unlike sensory perception and experience, thinking is an abstract, logical, and conscious form of cognition.

Through thinking, a person:

- Acquires new knowledge
- Solves problems
- Analyzes experience
- Improves professional skills and competencies

 Example: Before creating a new device, an engineer first thinks about its structure, performs calculations, and only then implements it in practice. This process illustrates the functioning of thinking.

The Importance of Thinking in Professional Activity

Thinking is the foundation of creative approach, problem-solving, and decision-making in any professional activity.

- **Engineer** — uses logical and technical thinking.
- **Teacher** — understands students through pedagogical and creative thinking.
- **Designer** — applies imaginative and creative thinking.
- **Lawyer** — evaluates evidence based on logical and analytical thinking.
- **Doctor** — makes diagnoses based on hypothesis formation and analysis.

 Practical example:
A doctor searches for the cause based on a patient's symptoms, compares data, and draws conclusions. This is an example of analytical and creative thinking in action.

3. Forms of Thinking

Thinking manifests in three main logical forms:

Form of Thinking	Definition	Example
Concept	Reflects the essential features of an object or phenomenon	The concept of "teacher" — a person who provides knowledge
Judgment	Affirmation or negation of an idea	"Every person must work"
Conclusion (Inference)	Deriving a new idea based on several judgments	If everyone works, society develops → conclusion

 Example:

- Concept: "Student"
- Judgment: "A student acquires knowledge."
- Conclusion: "A person who acquires knowledge is a student."

These forms of thinking form the basis of any professional reasoning, decision, or plan.

Types of Thinking

Types of thinking vary depending on the nature of activity, tasks, and level of cognition.

Type of Thinking	Definition	Professional Example
Theoretical (abstract)	Works with concepts, laws, and theories	A physicist or mathematician creates a theoretical model
Practical	Focused on solving problems in real activity	Driver, technician, tailor
Creative	Produces new ideas, solutions, or innovations	Designer, inventor, artist
Analytical	Analyzes an object by breaking it into parts	Analyst, economist, doctor
Intuitive	Finds solutions through sudden insight	Inspiration experienced by artists or inventors
Logical	Analyzes cause-and-effect relationships	Lawyer, engineer, programmer

 Example:
When writing new software, a programmer uses logical thinking, but creative thinking is also required when designing the interface.

5. Thinking Operations

Thinking consists of specific mental processes, known as operations:

Thinking Operation	Description	Example
Analysis	Breaking a whole into parts	Studying a machine by separating its components
Synthesis	Combining parts into a whole	Creating a new device from components
Comparison	Identifying similarities and differences	Comparing two smartphone models

Thinking Operation	Description	Example
Generalization	Forming a general conclusion based on shared features	Classifying various plants as “flowers”
Abstraction	Separating essential features from secondary ones	Viewing “labor” socially rather than materially
Modeling	Creating a model of a real object or process	An architect designs a building model
Problem-based thinking	Finding new solutions through contradictions or problems	Solving challenges in product development

 Example:
To design a new drone, an engineer first analyzes its components, then synthesizes them into a complete model, and finally compares it with competing models to identify advantages.

Examples and Practical Application

1. **In pedagogical activity:**
   Teachers develop students’ thinking skills through question–answer methods, analysis, and creative tasks.
   Example: The question “Why does water expand when it freezes?” encourages analytical and logical thinking.
2. **In economic activity:**
   An economist analyzes market trends, draws conclusions, and makes forecasts — an example of analytical thinking.
3. **In design and architecture:**
   Designers and architects create new forms, models, and facade solutions using imaginative and creative thinking.
4. **In programming:**
   A programmer designs an algorithm to solve a problem (logical thinking) and then implements it in practice (practical thinking).

Conclusion. Thinking is the highest form of human consciousness, enabling understanding, comparison, conclusion, and problem-solving. In professional activity, thinking determines a person's creative, logical, and practical abilities. During the process of mastering a profession, various forms and operations of thinking develop, enhancing skills and creative potential.

Individual Characteristics of Thinking. Human thinking is the ability to understand, analyze, generalize, and draw conclusions about the surrounding environment, events, and phenomena. However, thinking is not the same in all individuals — each person possesses a certain degree of individuality, that is, unique personal characteristics. These features depend on a person's knowledge, experience, worldview, temperament, and psychological state.

1. What Is Individuality in Thinking? Individuality is the set of unique characteristics that distinguish one person from others. Individuality in thinking is expressed in a person's way of reasoning, methods of problem-solving, speed of thinking, and breadth of ideas.

Example:
Two students are given the same task. One solves the problem logically, step by step, while the other reaches the solution creatively, using unconventional thinking.
→ These two approaches demonstrate individual differences in thinking.

2. Factors Determining Individual Differences in Thinking

1. Temperament and Character

- **Sanguine individuals** think quickly but may struggle to maintain attention for long periods.
- **Melancholic individuals** think more slowly but analyze deeply.
- **Choleric individuals** make fast and decisive decisions but may be impulsive.
- **Phlegmatic individuals** think steadily and accurately.

Example:
Sanguine students may quickly express ideas during group discussions, while phlegmatic students speak later but provide well-considered opinions.

2. Level of Knowledge and Experience

Thinking is based on experience. The more experience a person has, the more complex and precise their thinking becomes.

Example:
If an engineer and a student are given the same problem, the engineer solves it from a practical perspective, while the student approaches it theoretically.

3. Interests and Needs

People think more deeply about areas they are interested in.

Example:
An artist views a landscape from an aesthetic perspective, whereas a geographer evaluates it from a geological standpoint.

4. Emotional State and Psychological Stability

Stress and anxiety slow down thinking processes, while a positive emotional state enhances creativity and active thinking.

3. Individual Forms of Thinking

1. **Analytical thinking** — analyzing facts and drawing logical conclusions.
   Example: thinking typical of accountants or lawyers.
2. **Creative thinking** — the ability to generate new ideas and unconventional solutions.
   Example: designers or inventors.
3. **Synthetic thinking** — integrating different types of information into a unified solution.
   Example: engineers or researchers combining multiple methods.
4. **Critical thinking** — evaluating information critically and skeptically.
   Example: journalists or scientists assessing data objectively.

Methods for Developing Individual Thinking

1. Activating thinking through problem-based tasks.
2. Expanding knowledge across different fields (interdisciplinary approach).
3. Analytical and thinking exercises (e.g., providing multiple answers to the question “Why?”).
4. Participating in discussions and debates.
5. Keeping a creative writing or reflection journal.

Conclusion

Each person’s thinking is unique. This individuality is shaped by personal experience, knowledge, temperament, and worldview. Therefore, considering each individual’s thinking style in education and professional activity is a crucial factor for effective development.

“Everyone views the world through their own window. Some see opportunities, others see obstacles.”

The Role of Thinking in Mastering the Engineering Profession

Engineering is not only about calculations and technical knowledge; it is a profession that requires deep thinking, logical reasoning, and creative problem-solving abilities. Engineers face challenges daily: designing new devices, improving systems, and eliminating errors and malfunctions — all of which rely on thinking processes.

1. The Essence of Thinking and Its Importance in Engineering

Thinking is the process of understanding reality, analyzing it, and finding new solutions.

In engineering, thinking performs the following functions:

- **Analytical thinking:** breaking systems and processes into components for analysis.
- **Creative thinking:** generating new ideas and innovative solutions.
- **Logical thinking:** ensuring that every decision is well-founded and precise.
- **Critical thinking:** identifying errors and eliminating them.

 Example:
To design a new energy-efficient lamp, an electrical engineer first analyzes existing models (analytical thinking), then proposes new shapes and materials (creative thinking), and finally justifies and tests the idea logically (critical thinking).

Main Types of Thinking in Engineering

Logical Thinking

Every engineering solution must be scientifically justified.

Example:
A mechanical engineer determines the cause of a machine component failure through calculations.

1. Spatial Thinking

Engineers must be able to visualize models mentally.

Example:
An architect can imagine the internal structure of a building without physically seeing it.

2. Technical Thinking

A deep understanding of how tools and mechanisms operate.

Example:
An automotive engineer mentally analyzes how each part of an engine interacts with others.

3. Creative Thinking

The ability to create new inventions or solutions.

Example:
A programmer uses unconventional thinking when developing a new algorithm or artificial intelligence model.

3. Formation of Engineering Thinking

Engineering thinking does not develop naturally on its own; rather, it evolves through specific stages:

1. **During the educational process** — logical thinking foundations are formed through subjects such as physics, mathematics, and computer science.
2. **Through laboratory and practical work** — theoretical knowledge is linked with practice, leading to the development of technical thinking.
3. **In design and project activities** — creative and innovative thinking is strengthened.
4. **Through experience** — the ability to solve real-life problems is formed.

 Example:
A programming student first learns how to design an algorithm → then translates it into code → and later develops their own efficient method.
This is an example of the step-by-step formation of thinking.

4. The Importance of Thinking Culture for an Engineer

An engineer must not only create solutions but also justify, explain, and defend them to others. Therefore:

- Thinking must be **systematic**, that is, consistent and structured.
- Thinking must be **critical**, meaning the ability to foresee errors in advance.
- Thinking must be **innovative**, meaning openness to new ideas.

 Example:
In one company, two engineers work side by side: one continues using old methods, while the other experiments with new approaches. As a result, the second

engineer increases work efficiency by 20% — a clear outcome of innovative thinking.

5. Methods for Developing Engineering Thinking

1. Regularly solving problem-based tasks (problem-solving exercises).
2. Performing logical and creative thinking exercises.
3. Participating in scientific and technical projects.
4. Exchanging ideas in group discussions.
5. Staying informed about new technologies and software.

Conclusion

The foundation of the engineering profession is **thinking**.
Without engineering thinking, calculations, designs, or inventions cannot exist. The deeper an engineer's thinking ability, the more perfect and effective the product they create will be.

Therefore, every young person who aspires to become an engineer should develop **logical, technical, and creative thinking simultaneously**.

Inspirational quote:
"A good engineer is not just someone who memorizes formulas, but someone who can find solutions to every problem."

Flexibility of Operator Thinking and Its Evaluation

Practical Thinking in Operator Work

Engineering is not limited to calculations or technical knowledge; it is a profession that requires deep thinking, logical reasoning, and creative problem-solving abilities. Engineers face challenges daily, such as designing new devices, improving systems, and eliminating errors and malfunctions — all of which are carried out through thinking processes.

1. The Essence of Thinking and Its Importance in Engineering

Thinking is the process of understanding reality, analyzing it, and finding new solutions.

In the field of engineering, thinking performs the following functions:

- **Analytical thinking:** breaking systems and processes into components for analysis.
- **Creative thinking:** generating new ideas and unconventional solutions.

- **Logical thinking:** ensuring that every decision is well-founded and precise.
- **Critical thinking:** identifying errors and eliminating them.

 Example:
To design a new energy-efficient lamp, an electrical engineer first analyzes existing models (analytical thinking), then proposes new shapes and materials (creative thinking), and finally logically justifies and tests the idea (critical thinking).

2. Main Types of Thinking in Engineering

1. Logical Thinking

Every engineering solution must be scientifically grounded.

Example:
A mechanical engineer determines the cause of a detailed component failure through calculations.

2. Spatial (Visual–Spatial) Thinking

An engineer must be able to visualize models mentally.

Example:
An architect can imagine the internal structure of a building without physically seeing it.

3. Technical Thinking

A deep understanding of how tools and mechanisms operate.

Example:
An automotive engineer can mentally calculate how each engine component interacts with others.

4. Creative Thinking

The ability to create new inventions or solutions.

Example:
A programmer applies unconventional thinking when developing a new algorithm or an artificial intelligence model.

Formation of Engineering Thinking

Engineering thinking does not develop naturally; rather, it evolves through specific stages:

1. **During the educational process** — the foundations of logical thinking are formed through subjects such as physics, mathematics, and computer science.
2. **Through laboratory and practical work** — theoretical knowledge is linked with practice, which leads to the development of technical thinking.
3. **In design activities** — creative and innovative thinking becomes stronger.
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A programming student first learns how to design an algorithm → then translates it into code → and later develops their own efficient method.
This illustrates the step-by-step formation of thinking.

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 Example:
In one company, two engineers work together: one continues using old methods, while the other experiments with new approaches. As a result, the second engineer increases work efficiency by 20% — this is the outcome of innovative thinking.

Methods for Developing Engineering Thinking

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Without engineering thinking, calculations, designs, or inventions cannot exist.
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Inspirational quote:
“A good engineer is not just someone who memorizes formulas, but someone who can find solutions to every problem.”

Flexibility of Operator Thinking, Its Assessment, and Practical Thinking in Operator Work

In modern production and technical systems, the operator (dispatcher, control panel operator, process monitor) plays a very important role.

The operator’s task is to monitor technical processes, control them, and make fast and correct decisions when necessary. In this process, **flexibility of thinking** and **practical thinking** are of decisive importance.

1. What Is Flexibility of Operator Thinking?

Flexible thinking is the ability of a person to quickly adapt to new situations, change the direction of thinking under different conditions, and approach problems from alternative perspectives.

For an operator, this quality is especially important in the following situations:

- When unexpected faults or signals appear in the system;
- When the operating mode of equipment must be changed;
- When the situation changes rapidly and standard rules are no longer effective.

 Example:
An energy operator notices an increase in voltage through power plant sensors. First, the operator checks the automatic system; if it fails, they switch to manual mode and reconfigure power distribution.
This is an example of flexible thinking, as the operator abandons the standard scenario and finds a new solution.

Factors Determining the Flexibility of Operator Thinking

1. **Experience and skills** — an experienced operator evaluates situations faster because they have encountered similar cases before.
2. **Emotional stability** — the ability to make correct decisions even under stress.
3. **Broad knowledge base** — a general understanding of various technical processes.
4. **Fast thinking and divided attention** — the ability to monitor several processes simultaneously.

🎯 **Example:**
An air traffic controller manages five aircraft at the same time. If one aircraft requests an emergency descent, the controller recalculates the routes of the others to ensure safety.

Methods for Assessing the Flexibility of Operator Thinking

When training and selecting operators, the following methods are used to assess thinking flexibility:

No.	Assessment Method	Description	Example
1	Psychological tests	Testing reaction speed, attention, and memory	"Reaction speed" or "conflicting signals" tests
2	Simulation (training exercises)	Decision-making in conditions similar to real situations	Eliminating a malfunction on a virtual control panel
3	Observation in practice	Evaluating the number of errors, reaction speed, and decision quality during work	Observation during an 8-hour shift at a factory

 Example:
An operator is tested using a simulator: when an emergency signal is activated, they must press the correct button within 10 seconds. This demonstrates their reaction speed and flexible thinking.

Practical Thinking in Operator Work

Practical thinking is the ability to apply theoretical knowledge in real situations and make correct decisions while working with real objects and processes.

In operator work, practical thinking manifests itself in the following forms:

1. **Applying technical information in practice**
   → For example, stopping or starting a motor based on sensor readings.
2. **Rapid situation assessment and forecasting**
   → If the temperature is rising, the operator predicts what may happen in the next few minutes.
3. **Eliminating mechanical or software-related problems**
   → If a pump fails, the operator switches to manual mode or activates a backup line.

 Example: A pipeline operator notices that the pressure gauge is dropping. He immediately suspects a possible leak, opens the backup line, and prevents an accident.
This is an example of practical thinking and quick reaction.

Methods to Develop Adaptive and Practical Thinking:

1. Practice with problem-based tasks (problem-solving training).
2. Work with simulators and virtual training devices.
3. Conduct systematic analysis and "if…then" scenario exercises.
4. Engage in team discussions and experience sharing.
5. Perform stress management exercises to enhance mental resilience.

Conclusion: Success in an operator's work depends on their level of adaptive and practical thinking. Adaptive thinking enables an operator to make correct decisions in rapidly changing conditions, while practical thinking ensures the accurate execution of those decisions. Therefore, every operator must develop the ability to think quickly, withstand stress, and apply technical knowledge effectively in practice.

Words of Wisdom:
"An operator's main tool is their mind. If it is quick, accurate, and adaptive, any system will operate stably."

8 – Topic: Individual-Typological Characteristics in Engineering Activity

Outline:

1. Temperament and Professional Choice. Characteristics and Types of Temperament. Individual Style of Engineering Activity and Temperament. Understanding and Scientific Views on Temperament and Professional Skills Acquisition.
2. Character and Professional Qualities.
3. Professional Abilities and Skills in Engineering. Abilities, their Natural Foundations, and Professional Development of an Engineer.

Temperament and Professional Choice

A person's professional activity, attitude toward work, behavior in a team, and level of success largely depend on their temperament. Temperament is the dynamic aspect of a person's nervous system, reflecting innate psychological traits that determine behavior, emotional responses, work style, and learning activity.

Understanding one's temperament is crucial for choosing a profession, adapting to the workplace, and performing effectively.

Types of Temperament:

1. **Sanguine**
    - **Characteristics:** Active, lively, sociable, cheerful, quick to adapt.
    - **Strengths:** Thinks quickly, enjoys teamwork, open to new experiences.
    - **Weaknesses:** Sometimes cannot maintain attention for long; may start tasks quickly but not finish them.
    - **Suitable Professions:** Journalist, teacher, advertising specialist, actor, manager.
    - **Example:** Dildora, a sanguine girl, successfully became a TV presenter due to her social activity and communication skills.
2. **Choleric**
    - **Characteristics:** Energetic, strong-willed, determined, emotional.
    - **Strengths:** Strong leadership, quick decision-making.
    - **Weaknesses:** Nervous, impatient, may act in anger.
    - **Suitable Professions:** Leader, entrepreneur, lawyer, military officer, athlete.
    - **Example:** Baxtiyor, a choleric young man, achieved great success as a sports coach due to his energy and determination.
3. **Phlegmatic**
    - **Characteristics:** Calm, stable, slow, but thorough.
    - **Strengths:** Attentive, hardworking, enjoys planning.
    - **Weaknesses:** Slow to adapt to new situations, tends to act slowly.
    - **Suitable Professions:** Accountant, programmer, engineer, archivist, lab assistant.
    - **Example:** Shavkat, a phlegmatic programmer, works meticulously and is very attentive to errors.
4. **Melancholic**
    - **Characteristics:** Sensitive, emotional, introspective, but shy.
    - **Strengths:** Thinks creatively, deeply reflective, empathetic.
    - **Weaknesses:** Enthusiasm fades quickly, low self-confidence.
    - **Suitable Professions:** Artist, writer, psychologist, music teacher, translator.
    - **Example:** Dilnoza, a melancholic girl, chose psychology as her profession due to her sensitivity and observational skills.

Relationship Between Temperament and Career Choice:
Considering temperament in professional choice:

- Ensures professional compatibility;
- Reduces stress;

- Increases efficiency;
- Strengthens professional motivation.

For instance:

- Choleric individuals fit dynamic jobs requiring quick decisions.
- Phlegmatic individuals prefer calm, orderly work environments.
- Melancholic individuals excel in creative fields.
- Sanguine individuals succeed in team-oriented activities.

Conclusion:
Understanding temperament is crucial for self-awareness, choosing the right profession, and achieving professional success. Each temperament type has unique advantages and potentials. The key is to recognize one's temperament and align it with the chosen profession.

Characteristics of Temperament. Every individual differs in behavior, emotional sensitivity, attitude toward work, and physical and mental activity. These differences are largely determined by temperament — a set of psychological traits reflecting the dynamic aspects of the nervous system.

Temperament influences the speed of activity, emotionality, movement pace, and stability. While related to character, temperament is innate, whereas character develops through life experience.

Key Features of Temperament:

1. **Activity** – Level of engagement, initiative, and energy in work.
    - *Example:* Sanguine students actively participate in lessons, ask questions, and lead group work.
2. **Emotional Stability** – Degree of susceptibility to emotional fluctuations.
    - *Example:* Choleric individuals get angry quickly; melancholics are deeply affected by emotions.
3. **Reactivity** – How quickly a person responds to external stimuli.
    - *Example:* Sanguine individuals quickly forget reprimands; melancholics may stay upset for a long time.
4. **Adaptability** – Ability to adjust to new conditions.
    - *Example:* Phlegmatic individuals adapt slowly to a new team; sanguine individuals adapt easily.
5. **Quickness** – Speed of thinking and action.
    - *Example:* Choleric and sanguine individuals make fast decisions; phlegmatic individuals think carefully first.

Example: Choleric, Phlegmatic, and Melancholic Temperaments

Choleric Temperament

- **Characteristics:** Energetic, determined, easily excitable, with leadership qualities.
- **Strengths:** Goal-oriented, strong-willed, active.
- **Weaknesses:** Impatient, hot-tempered, may have difficulty controlling emotions.
- **Suitable Professions:** Sports coach, leader, military officer, lawyer, entrepreneur, athlete.
- **Example:** Baxtiyor, a choleric young man, works as a sports coach and inspires his trainees with his determination and energy.

Phlegmatic Temperament

- **Characteristics:** Calm, slow, stable, hardworking, patient.
- **Strengths:** Reliable, organized, balanced.
- **Weaknesses:** Slow to adapt to new situations, sometimes passive.
- **Suitable Professions:** Accountant, engineer, lab assistant, programmer.
- **Example:** Shavkat, a phlegmatic programmer, performs his work thoroughly and accurately.

Melancholic Temperament

- **Characteristics:** Sensitive, reflective, introverted, emotionally delicate.
- **Strengths:** Creative, empathetic, able to understand others' emotions.
- **Weaknesses:** Low self-confidence, stress-sensitive, easily upset.
- **Suitable Professions:** Writer, artist, psychologist, translator, musician.
- **Example:** Dilnoza, a melancholic girl, achieved success in art due to her sensitivity and aesthetic taste.

Differences Between Temperament Types

Feature	Sanguine	Choleric	Phlegmatic	Melancholic
Activity	Very high	High	Medium	Low
Emotionality	Fast but stable	Strong, rapidly changing	Stable	Deep
Work Pace	Fast	Very fast	Slow	Slow
Adaptability	Fast	Fast	Slow	Difficult
Sociability	High	Medium	Low	Very low

Conclusion. Temperament is the natural, innate psychological foundation of a person. It determines a person's vitality, emotionality, and pace of activity. Each temperament type has its own positive and negative aspects. The key is for a person to understand their temperament and learn to manage it effectively. In this way, they can achieve success in life and in their profession.

Individual Style and Temperament in Engineering. Human psychological activity—including thinking, emotions, actions, and behavior—varies among individuals. Some respond quickly to everything, while others act calmly and thoughtfully. These differences are largely determined by temperament.

Temperament is a psychological state based on innate characteristics of the nervous system, reflecting the dynamic aspects (speed, activity, stability) of a person's behavior. Temperament is closely related to character, but they are different: temperament is innate, whereas character develops throughout life.

Key Features of Temperament

1. **Activity** – A person's energy for work, labor, and study.
    - *Example:* Sanguine students are active in lessons, participate in discussions, and propose new ideas.
2. **Emotional Stability** – The degree to which emotions are stable or variable.
    - *Example:* Melancholics internalize their feelings, while cholerics become excited quickly.
3. **Reactivity** – How quickly a person responds to external stimuli.
    - *Example:* Cholerics take criticism seriously, while phlegmatics remain calm.
4. **Adaptability** – Speed of adjustment to new environments or new people.
    - *Example:* Sanguines quickly adapt to a new team, while phlegmatics adapt only over time.
5. **Speed of Action** – Speed of thinking, speaking, and task execution.
    - *Example:* Cholerics act quickly, while melancholics act slowly but carefully.

Types of Temperament and Their Descriptions

In psychology, there are four main types of temperament. These were identified by the ancient Greek scholar Hippocrates: **sanguine, choleric, phlegmatic, and melancholic.**

1. Sanguine Temperament

- **Characteristics:** Active, cheerful, social, quick-thinking, humorous.
- **Strengths:** Adapts quickly, works well in a team, positive-thinking.
- **Weaknesses:** May start tasks quickly but not finish them; cannot maintain attention for long.
- **Suitable Professions:** Teacher, journalist, TV presenter, advertising specialist, manager.

- **Example:** Laylo, a sanguine girl, became a successful TV presenter due to her communication skills and cheerful personality.

2. Choleric Temperament

- **Characteristics:** Energetic, determined, easily excited, with leadership qualities.
- **Strengths:** Goal-oriented, strong-willed, active.
- **Weaknesses:** Impatient, hot-tempered, has difficulty controlling emotions.
- **Suitable Professions:** Leader, military officer, lawyer, athlete, entrepreneur.
- **Example:** Baxtiyor, a choleric young man, works as a sports coach, manages his team with determination, and motivates them to win.

3. Phlegmatic Temperament

- **Characteristics:** Calm, stable, hardworking, thoughtful, patient.
- **Strengths:** Performs tasks thoroughly, attentive, maintains calm.
- **Weaknesses:** Lethargic in perception, slow to adapt to new situations.
- **Suitable Professions:** Engineer, accountant, programmer, lab assistant, archivist.
- **Example:** Shavkat, a phlegmatic programmer, carefully checks every line of code and avoids mistakes.

4. Melancholic Temperament

- **Characteristics:** Sensitive, thoughtful, emotionally rich, introverted, calm.
- **Strengths:** Creative, empathetic, attentive to others, loyal.
- **Weaknesses:** Low self-confidence, easily upset, not proactive.
- **Suitable Professions:** Artist, writer, translator, psychologist, music teacher.
- **Example:** Dilnoza, a melancholic girl, succeeded in art by expressing her emotions through paintings.

Comparative Table of Temperament Types

Feature	Sanguine	Choleric	Phlegmatic	Melancholic
Activity	High	Very high	Medium	Low
Emotionality	Stable	Rapidly changing	Stable	Deep
Adaptability	Fast	Medium	Slow	Difficult
Work Pace	Fast	Very fast	Slow	Slow
Sociability	High	Medium	Low	Low

Conclusion on Temperament

Temperament is the innate psychological foundation of a person. It affects a person’s emotions, behavior, work pace, and social manners. Each individual’s temperament type has its own strengths and weaknesses. The key is for a person to correctly understand their temperament and learn to manage their activities through it. A person who can properly guide their temperament can achieve success both in life and in their profession.

Temperament is a psychological state based on the innate characteristics of the nervous system, reflecting the speed, stability, and intensity of mental activity.

A person's attitude towards study, work, communication, and social activity is closely linked to their temperament. Temperament manifests itself in a person's activity level, emotionality, attentional stability, and adaptability.

For example:

- Sanguine students are active in lessons, respond quickly, and behave freely in groups.
- Phlegmatic students are slow but thorough and can concentrate well.

Thus, temperament can be seen as the "speed of mental activity" of a person, the natural pace and intensity of their psychological processes.

Concept of Professional Skills and Abilities

Professional skill is the ability to perform a specific professional activity effectively, formed on the basis of knowledge, abilities, experience, and psychological readiness.

Professional ability refers to practical, automated methods of performing tasks acquired during professional activity.

Professional skills develop in the following stages:

1. Acquiring theoretical knowledge.
2. Gaining experience through practical exercises.
3. Forming professional habits and automated actions.

For example:

- For a doctor – accurate diagnosis of patients.
- For a teacher – precise lesson planning.
- For a programmer – speed and accuracy in writing code.

Relationship Between Temperament and Professional Skills

Temperament determines the mental rhythm and work style during the acquisition of professional skills. Each temperament type has its own advantages and limitations in professional activity.

Sanguine:

- Learns quickly, active, open to new things.
- Acquires professional skills rapidly but may struggle with tasks requiring prolonged attention.
- *Example:* A sanguine student quickly learns new computer programs but may lose interest over time.

Choleric:

- Strong-willed, goal-oriented.
- Performs complex tasks persistently but is easily stressed.
- *Example:* A choleric athlete achieves high results through disciplined training.

Phlegmatic:

- Slow but thorough.
- Learns professional skills slowly, but retains what is learned for a long time.
- *Example:* A phlegmatic accountant manages accounts very accurately and makes no mistakes.

Melancholic:

- Sensitive, emotional, reflective.
- Excels in creative professions but may be hesitant in group activities.
- *Example:* A melancholic artist expresses emotions through paintings but takes criticism seriously.

Scientific Research on Temperament and Career Choice

Psychologists such as I.P. Pavlov, H. Eysenck, B.M. Teplov, and C. Jung studied temperament based on the activity of the human nervous system. Their findings indicate:

- Temperament plays an important role in career choice.
- Each profession requires a certain psychological rhythm.

For example:

- Sanguine – suitable for active and social professions (teacher, journalist).
- Choleric – leadership and military fields.
- Phlegmatic – analytical and accounting work (accountant, engineer).
- Melancholic – creative fields (artist, writer, psychologist).

Thus, temperament is a psychological factor that determines how quickly and effectively professional skills are acquired.

Real-Life Examples

- **Example 1:** Dildora, a sanguine student, chose journalism. She quickly establishes contact with new people, easily conducts conversations, and learns her profession rapidly.
- **Example 2:** Shavkat, a phlegmatic young man, studies accounting. He works slowly but accurately, and his supervisors appreciate his thoroughness.
- **Example 3:** Baxtiyor, a choleric athlete, pursued a coaching career using his strong energy and determination.
- **Example 4:** Dilnoza, a melancholic student, chose psychology. She deeply understands people’s emotions, which brings her professional success.

Conclusion:
Temperament is the set of innate psychological traits that play a crucial role in mastering professional activity and developing skills and abilities. A person who understands their temperament:

- Chooses a suitable profession,
- Achieves success in study and work,
- Learns to manage stress.

Thus, understanding temperament is the psychological key to professional growth.

Concept of Character and Its Role in Personal Development

Character is the set of psychological traits manifested in a person's consistent behavior, actions, and relationships. Character is clearly visible in a person's:

- Relationships with others,
- Attitude toward work,
- Views toward themselves and the environment.

Character is the core of personality, its "inner image." Unlike temperament, character is formed through social experience and upbringing.

For example:

- Some people are honest, hardworking, and patient, while others may be impulsive or irresponsible.

These differences are distinctions in character.

Factors Influencing Character Formation

Character is not innate; it develops throughout life. Its development is influenced by:

1. **Family upbringing** – Values, discipline, and sense of responsibility instilled by parents form the basis of character.
    - *Example:* Kind and fair parents develop empathy and responsibility in their children.
2. **Social environment** – Friends, school, community, and societal values influence character.
3. **Activity and experience** – A person strengthens their character through study, work, and life trials.
4. **Self-education** – A person analyzes themselves, strengthens positive traits, and abandons negative habits.

Concept of Professional Qualities. Professional qualities are personal, psychological, and moral traits necessary for effectively mastering and performing a profession.
They are divided into two groups:

1. General professional qualities:
Necessary for any profession:

- Diligence
- Responsibility
- Discipline
- Attention
- Honesty
- Patience
- Initiative

2. Specific professional qualities:
Traits specific to a certain profession:

- Teacher – speech culture, pedagogical tact
- Doctor – attentiveness, compassion
- Engineer – logical thinking, precision
- Lawyer – justice, determination

Relationship Between Character and Professional Qualities. Character and professional qualities are closely connected. A person with strong positive character traits can achieve success in any profession.

Some character traits and their suitable professions:

Character Traits, Descriptions, and Suitable Professions

Character Trait	Description	Suitable Professions
Responsibility	Performs every task seriously	Accountant, teacher, doctor
Determination	Does not give up in difficult situations	Military, manager, athlete
Initiative	Generates new ideas	Entrepreneur, inventor, manager
Compassion	Helps others	Doctor, social worker, psychologist
Peacefulness	Creates balance in a team	Teacher, educator, diplomatic

Character Trait	Description	Suitable Professions
		staff

Real-life examples:

- **Example 1:** Dilafruz, a teacher, earned the trust of her students with her patient, compassionate, and fair character. She has perfectly developed her professional qualities (organization, speech culture, kindness toward children).
- **Example 2:** Baxtiyor, a doctor, approaches his profession responsibly. His honesty and attentiveness help patients recover quickly.
- **Example 3:** Sardor, a choleric manager, is determined, demanding, and strong-willed. He can unite his team toward a goal, demonstrating the harmony of his character and professional qualities.
- **Example 4:** Shavkat, a phlegmatic engineer, works accurately, thoroughly, and calmly. This is related to his stable character.

Conclusion:
Character is the most important psychological foundation of a person, while professional qualities are its expression in work. A person with a positive character:

- Performs their profession sincerely,
- Earns respect within a team,
- Sets goals and achieves them.

Thus, the key to professional success is a positive character combined with well-developed professional qualities. By understanding and improving one's character, a person can master their profession.

Professional Abilities and Skills in Engineering

Professional ability is a set of individual psychological and intellectual traits that allow a person to successfully perform a specific professional activity.

Types of professional abilities in engineering:

1. **Intellectual (mental) abilities:**

- Logical thinking
- Analytical and synthesis skills
- Systematic approach to problems

- Mathematical and technical reasoning
  □ *Example:* An engineer analyzes system problems logically and finds an optimal solution when developing a program.

2. **Practical (technical) abilities:**

- Skill in working with tools and equipment
- Reading and creating technical drawings
- Monitoring technological processes
  □ *Example:* A mechanical engineer designs a machine part model on a computer and tests it using a 3D printer.

3. **Creative abilities:**

- Creating innovations and discoveries
- Improving technical processes
- Innovative thinking
  □ *Example:* An engineer develops a new energy-saving device, demonstrating his creative ability.

4. **Organizational and communicative abilities:**

- Working in a team
- Leadership
- Explaining technical ideas to others
  □ *Example:* An engineer leading a project effectively manages his team.

Professional Skills and Their Development

Professional skill is the ability to perform one's profession at a high level, creatively applying experience, knowledge, and abilities.

Professional skills develop in three stages:

1. **Initial stage** – learning theoretical knowledge and gaining experience
   □ *Example:* A student engineer studies the basics of technical drawings and programming languages.
2. **Practical stage** – applying knowledge in practice
   □ *Example:* A graduate defends their project in production.
3. **Creative stage** – creating innovations, teaching experience to others, implementing innovations
   □ *Example:* An experienced engineer develops a new automated system and trains junior staff.

Relationship Between Abilities and Skills in Engineering

In engineering, abilities and skills complement each other:

Process	Engineer's Ability	Result
Problem analysis	Intellectual ability	Finding correct solutions
Designing	Creative and technical ability	Creating effective models
Work process management	Organizational ability	Team success
Evaluating results	Analytical thinking	Improving work quality
Introducing innovations	Innovative thinking	Increasing professional mastery

 Example: An IT systems engineer applies intellectual and creative abilities when developing software. As experience grows, they gain professional skill in managing complex systems.

Real-life Examples

- **Example 1:** Azamat, a young engineer, initially had theoretical knowledge. During practical experience, he learned to solve technical problems and improved his professional skills.
- **Example 2:** Dilnoza, a female engineer, developed a new automated system for a technological production line. Her creativity and high professional skill increased productivity by 30%.
- **Example 3:** Rustam, an energy engineer, stands out with his communicative abilities in managing his team, implementing projects effectively while considering each employee's opinion.

Conclusion:
In an engineering system, professional abilities and skills are closely interconnected:

- **Ability** is the inner potential leading to success,
- **Skill** is the professional excellence formed through experience and practice.

A modern engineer must be:

- Well-versed in technical knowledge,
- Creative and proactive,

- Able to approach problems systematically,
- Capable of working effectively in a team.

Thus, developing professional abilities and improving skills should be a core goal for an engineer.

Abilities, Their Natural Basis, and Professional Development

Ability is a set of individual psychological traits that allow a person to successfully perform a particular activity (study, work, creativity, management, etc.). Abilities are the psychological capacities that ensure the fast, deep, and effective acquisition of knowledge and skills.

They are closely connected with:

- Thinking speed
- Memory, attention, imagination
- Emotional and volitional traits

For example:

- A programmer needs logical and technical thinking abilities.
- A teacher needs speech ability and attention control.
- An engineer requires a combination of analytical, creative, and technical abilities.

Natural (Biological) Basis of Abilities

Every person's abilities are formed based on certain natural foundations, namely the characteristics of the nervous system and brain activity.

The natural bases are as follows:

1. **Type of nervous system** (strong, stable, quick, or weak) – affects a person's temperament, which in turn influences the development of abilities.
2. **Development of perception and sensory organs** – For engineers, vision, hearing, and spatial imagination are important.
3. **Brain activity and genetic potential** – Represents the natural source of intellectual potential.
4. **Healthy physiological condition** – Physical health, attention, and diligence actively enhance abilities.

 Example: A child inclined toward engineering shows interest in technical objects from childhood, analyzes mechanical toys, and strives to understand their structure. This is an initial sign of the natural basis of abilities.

Types of Abilities and Their Development

In psychology, abilities are divided into two main types:

1. **General abilities:** These are psychological traits that manifest across all types of activities and are necessary for many fields:

- Intellectual activity
- Ability to concentrate
- Memory strength
- Communication skills
- Adaptability

 Example: An engineer succeeds in learning a new technology by thinking quickly and concentrating attention.

2. **Special abilities:** These are individual capacities specific to a particular profession or activity:

- Technical and design abilities
- Spatial thinking
- Mathematical reasoning
- Systematic analysis and modeling abilities
- Creative and innovative thinking

 Example: An architect, when designing a project, must possess not only technical knowledge but also spatial imagination and aesthetic sense.

Role of Abilities in Engineering

The engineering profession is a complex activity that combines scientific knowledge, analysis, technical thinking, and creative approaches. The most important abilities for an engineer are:

- **Analytical thinking ability** – breaking down problems into parts and identifying causes and effects.
- **Technical imagination ability** – visualizing mechanical and electronic systems in space.
- **Creative thinking** – updating existing technologies and developing new ideas.
- **Organizational and communicative abilities** – managing a team and explaining technical ideas to others.

 Example: An electrical engineer analyzes a circuit to identify a system malfunction, diagnoses the problem, and proposes a new solution – demonstrating technical and analytical abilities.

Stages of Professional Development for Engineers

Professional development of an engineer occurs in several stages:

1. Orientation stage (student period)

- Learning theoretical knowledge
- Identifying and developing abilities
- Forming technical thinking

 Example: A student actively participates in laboratory work during studies and develops technical abilities.

2. Practical experience stage (internship period)

- Developing technical skills through practical training
- Learning real production processes

 Example: A young engineer works at a company, handles project drawings, and learns to apply them in practice.

3. Professional skill stage (expert period)

- Creative approach and innovative thinking
- Developing new technologies
- Advancing to senior specialist or managerial positions

 Example: An experienced engineer modernizes a production system, thereby increasing the company's efficiency.

Real-life Examples

- **Example 1:** Kamol, a young engineer, was interested in technical drawings and programming during university. His natural reasoning ability and technical intuition turned him into a skilled software engineer.
- **Example 2:** Dilshod, an engineer, achieved high results in precision-demanding work with electrical systems, indicating his developed attention and analytical thinking abilities.
- **Example 3:** Sevara, an engineer, developed a new control algorithm for an automated production line. Her creative abilities and independent thinking reduced the company's energy consumption.

Conclusion:
Ability is a person's natural potential, and its proper development is the key to professional success.

For engineers, professional mastery emerges when:

- Natural intellectual potential,
- Creative approach,
- Logical analysis and technical skills

…are harmoniously combined. Therefore, every engineer who knows their natural potential and develops it through study, practice, and experience can become a highly qualified specialist.

Topic 9. The Role of Emotional-Volitional and Personal Traits in Increasing the Efficiency of Engineering Staff

Outline:

1. Emotional-volitional sphere of the engineer's personality and adaptation to the profession.
2. Expression of emotional states. Types of emotions. Anxiety, fear, professional neuroses. Psychological assistance methods for employees after mental trauma.
3. General characteristics of volitional activity. Volitional qualities of personality and their development. Volitional control of behavior. Understanding the psychology of professional adaptation and forming scientific views.

Emotional-Volitional Sphere of the Engineer's Personality and Professional Adaptation

The **emotional-volitional sphere** is a set of a person's emotional states (happiness, fear, confidence, anxiety) and volitional qualities (patience, determination, responsibility, self-control). This sphere is crucial in engineering, as every decision is related to technical safety, accuracy, and efficiency.

Example: In case of a malfunction in the electrical network, an engineer must calmly assess the situation without panic and select precise actions to reduce risk.

Role of Emotional-Volitional Traits in Engineering

Key emotional-volitional traits necessary for engineers:

Trait	Description	Practical Example
Responsibility	Understanding the consequences	Strictly following technical

Trait	Description	Practical Example
	of one’s decisions	standards in a project
Determination	Acting towards goals despite difficulties	Reworking experiments even if initial tests fail
Patience	Ability to wait for results and manage processes	Enduring long experiment durations
Emotional stability	Not giving in to stress	Maintaining calm under workplace pressure
Creative approach	Solving problems in non-standard ways	Developing energy-efficient solutions

Professional Adaptation Process and Stages

Professional adaptation is the process of mentally, socially, and emotionally adjusting to new work conditions, team dynamics, and professional requirements.

Types of adaptation:

1. **Psychological adaptation** – internal emotional preparation for a new workplace, environment, leadership, and team, feeling confident.
2. **Social adaptation** – finding one’s place in the team, following team values and rules.
3. **Emotional adaptation** – managing stress, anxiety, and feelings related to new conditions.

Stages of adaptation:

1. **Orientation stage** – familiarization with new workplace, team, and procedures.
2. **Active integration** – demonstrating abilities, taking on professional roles.
3. **Stabilization** – finding one’s place, improving professional skills and experience.

Example: A young engineer joining a new company first learns new technologies, then participates in small projects, gradually moving on to complex and responsible tasks.

Example 1: A new engineer at a production plant observes technical processes, consults experienced specialists, and then offers their suggestions. Within 3–6 months, they become a full member of the team.
Example 2: A project engineer learns to work with new software. Initially, there

are many mistakes, but with patience and practice, they become a leading specialist in the team.

Conclusion:
The emotional-volitional sphere of an engineer is crucial for professional success. Technical knowledge and skills may be sufficient, but without emotional stability, willpower, and adaptability, achieving true professionalism is difficult. Therefore, engineering education must develop not only technical skills but also psychological readiness, stress management, and volitional traits.

Emotional State: Concept and Psychological Essence

Emotional state is a person's subjective attitude toward the environment, activities, and themselves, manifested in mood, feelings, affect, and stress. In psychology, emotional states are reflected in behavior, speech, actions, and facial expressions through internal experiences.

Examples:

- A student feels nervous before an exam — a state of emotional preparation.
- An engineer feels inspired when receiving a new project task — a positive emotional state.
- Anxiety due to a malfunction at work — a negative emotional state.

Physiological, Facial, and Verbal Expression of Emotions

Emotions are manifested throughout the body in the following forms:

a) Physiological expression:
Emotions are reflected in heart rate, breathing, blood pressure, sweat gland activity, and muscle tension.

Example: When an engineer detects a hazardous situation, their heart rate accelerates, attention sharpens, and movements become quick and precise.

b) Facial expression:
Facial movements (eyes, eyebrows, lips, forehead) are the main means of conveying emotions. According to psychologist Paul Ekman, there are six basic emotional expressions:

1. Joy
2. Anger
3. Fear
4. Surprise
5. Disgust
6. Sadness

Example: When an experiment succeeds, an engineer smiles with joy; an unexpected malfunction evokes surprise or anxiety.

c) Verbal expression:
Emotions are expressed through speech tone, pitch, speed, and intonation.

Example: Talking about a success, a person's voice is louder and energetic. Under stress, speech slows, tone lowers, and words may come out disorderly.

Social and Individual Differences in Emotional States

Emotional expression depends on personal temperament, cultural values, upbringing, and experience.

- **Social differences:** In some cultures, open expression of emotions is normal; in others, it is less acceptable. For instance, Japanese people tend to restrain emotions, while Uzbek culture encourages collective expression of joy and sadness.
- **Individual differences:** Sanguine individuals express emotions quickly and openly; phlegmatic individuals respond calmly and slowly.

Manifestation of Emotional States in Engineers

In engineering, emotional states influence technical decision-making, teamwork, and stress management.

Examples:

- **Positive emotional state:** An engineer successfully tests a new technology and feels confident, enhancing creative activity.
- **Negative emotional state:** Discovering a malfunction causes emotional tension; if unmanaged, it affects decision quality.
- **Neutral state:** During technical calculations, an engineer maintains emotional balance — a sign of professional stability.

Methods for Managing Emotional States

Engineers and students must learn to manage their emotions, as this directly affects professional efficiency.

Main Methods for Managing Emotional States

Key methods:

1. **Self-control** – recognizing each emotional reaction and consciously managing it.

2. **Breathing exercises** – helpful for reducing stress and improving concentration.
3. **Relaxation through music and sports** – reduces emotional tension.
4. **Positive thinking** – turning negative situations into positive ones.
5. **Team communication** – sharing emotions with others provides psychological relief.

Practical example: When a technical project is carried out under pressure, engineers take short breaks and hold team discussions — this reduces emotional tension and restores a creative work environment.

Conclusion: Emotional states are an important psychological process that reflects a person's inner world and affects their professional activity. Correctly understanding and managing them ensures not only personal stability but also professional success. An engineer's emotional culture, self-control, and stress tolerance are essential for technical safety and effective teamwork.

Types of Emotions

Emotion is a person's subjective experience of their environment, activities, and interactions with others — essentially, an inner feeling. Emotions express the inner world and regulate behavior.

In psychology, emotions are considered:

- a source of motivation,
- a factor regulating behavior,
- a means facilitating communication.

Example: An engineer feels inspired while working on a new project — this is a positive emotion. If the project fails, frustration occurs — a negative emotion.

Main Types of Emotions

a) Basic (primary) emotions: These are innate emotions linked to biological needs:

- Joy
- Anger
- Fear
- Disgust
- Surprise
- Sadness

Example: An engineer feels joy when an experiment exceeds expectations; malfunction leads to anger or frustration.

b) Social emotions: These develop through social interaction, work, and communication:

- Respect
- Honor, integrity
- Pride
- Conscience
- Sense of responsibility

Example: An engineer feels pride when their project benefits society; guilt occurs if they make a wrong decision.

c) Moral emotions: Linked to a person's ethical values:

- Compassion, empathy
- Sense of justice
- Guilt
- Gratitude

Moral emotions create a healthy team environment. Example: A lead engineer expressing gratitude to the team increases motivation.

d) Aesthetic emotions: Arising from appreciation of beauty and harmony:

- Enjoying the design aesthetics of a project
- Being amazed at the perfection of a technical solution

These emotions are an important component of engineering creativity.

Positive, Negative, and Complex Emotions

Positive emotions: Joy, confidence, love, pride, satisfaction — encourage activity and increase efficiency.
Example: Feeling joy after successfully completing a team project motivates further work.

Negative emotions: Fear, anger, hatred, frustration, hopelessness — hinder activity but can sometimes serve as warnings.
Example: An engineer feels caution when aware of potential safety violations.

Complex emotions: Affect, stress, mood, and passion.

- **Affect:** Short-term, intense emotional outburst.
  Example: An engineer hitting equipment out of anger due to a malfunction — affects rational control temporarily.

- **Stress:** Prolonged emotional strain, often due to time pressure, responsibility, or technical failures. Proper stress management indicates professional stability.
- **Mood:** Long-lasting emotional background affecting performance. Positive mood enhances creativity; negative mood reduces focus and increases errors.
- **Passion (enthusiasm):** Deep, strong, stable emotional state associated with striving toward goals.
  Example: Passion motivates an engineer to develop new technologies or solve complex problems, boosting creative activity.

Manifestation of Emotions in Engineers

Even though engineering relies on logic, analysis, and calculation, emotions play a critical role.

Practical examples:

- **Positive emotion:** Pride and confidence after a successful project test.
- **Negative emotion:** Technical errors or time constraints lead to anger and stress.
- **Passionate approach:** Working day and night to find a solution demonstrates professional enthusiasm.

Conclusion: Engineers must possess not only technical knowledge but also emotional stability, willpower, and stress management skills. Understanding and controlling emotions ensures professional competence, team harmony, and creative efficiency. Therefore, higher technical education should cultivate not only analytical thinking but also emotional culture and psychological resilience in students.

Anxiety, Fear, Professional Neuroses, and Psychological Assistance

Anxiety — an internal state of unease before an uncertain threat or potential negative event. Often associated with stress, workload, or responsibility.

Symptoms:

- Increased heart rate
- Distracted attention
- Sleep disturbances
- Reduced work focus
- Loss of self-confidence

Example: An engineer worries about making technical errors in a new project, reducing attention and concentration.

Fear — a natural reaction to real or perceived danger, serving as a protective mechanism but excessive fear impairs performance.

Types of fear:

- Fear of making technical mistakes
- Fear of criticism from leadership
- Fear of injury or accidents at work

Example: A new engineer hesitates to make independent decisions due to fear of errors during experiments.

Professional neuroses — mental disorders arising from prolonged stress, high responsibility, and emotional pressure in the workplace.

Main types:

1. **Neurasthenia (nervous exhaustion):**
    - Cause: constant stress, overload, sleep deprivation
    - Symptoms: rapid fatigue, irritability, reduced attention
    - Example: Overworked software developers or engineers
2. **Excessive anxiety:**
    - Constantly worrying about every mistake
    - Example: An engineer repeatedly checks technical calculations, lacking self-confidence
3. **Phobias (irrational fears):**
    - Unfounded fear of specific objects or situations
    - Example: An electrical engineer excessively fearing high voltage
4. **Depressive neurosis:**
    - Mood decline due to work failures or mental fatigue

Main Causes of Professional Neuroses

- Excessive workload
- Hazardous working conditions
- Pressure from management
- Lack of sleep and rest
- Personal problems

Impact of Psychological Trauma on Employee Performance

Psychological trauma (psychotrauma) — a deep psychological mark resulting from a strong emotional shock or unpleasant event.

Causes:

- Workplace accidents, fires, explosions
- Injury or death of a colleague
- Unexpected dismissal from work
- Responsibility for technical malfunctions

Effects:

- Decreased interest in work
- Reduced attention and memory
- Lowered enthusiasm and motivation
- Sleep disturbances, anxiety, and depression

Example: After an accident, a technician may fear working with high voltage, negatively affecting professional performance.

Methods of Psychological Support after Trauma

Psychological support should be systematic and step-by-step:

1. **Psychological conversation (ventilation method)**
    - Provide conditions for the employee to openly express feelings.
    - Psychologist listens attentively without judgment.
    - Goal: reduce internal emotional pressure.
2. **Mental relaxation (relaxation exercises)**
    - Breathing exercises, calming music, meditation.
    - Normalize heart rate and reduce muscle tension.
3. **Cognitive-therapeutic approach**
    - Analyze negative thoughts and replace them with positive ones.
    - Example: Replace “I made a mistake” with “I learned from this mistake.”
4. **Team support**
    - Positive attitude and help from colleagues accelerate recovery.
5. **Professional rehabilitation**
    - Gradually return the employee to work, assigning complex tasks step by step.

Recommendations for Maintaining Mental Health in Engineering:

- Organize proper work-rest schedules
- Engage in sports and relaxation activities to reduce stress
- Create a healthy psychological environment in the team
- Resolve conflicts peacefully
- Consult a psychologist regularly

Practical example: After an industrial accident, engineers undergo a three-stage psychological rehabilitation:

1. Conversations and psychological support
2. Physical relaxation and training
3. Gradual reintegration into the workplace

Conclusion: Anxiety, fear, and professional neuroses can be part of modern work life, but they can be managed. Timely psychological support helps employees recover faster and restore professional effectiveness. Psychological stability, stress resistance, and self-control are essential indicators of professional competence in engineering.

Volitional Activity: General Characteristics, Willpower Traits, and Their Development

Will (volition) — the conscious ability to perform goal-directed activities, overcome obstacles, and control one's actions. Will distinguishes humans from animals and ensures conscious regulation of behavior.

Volitional activity — a system of conscious, stable, goal-directed, and responsible actions.

Key features of volitional activity:

- Conscious goal-setting
- Decision-making
- Overcoming obstacles
- Maintaining commitment to the goal

Example: An engineer working on a complex project continues despite technical difficulties, demonstrating patience and persistence — a manifestation of volitional activity.

Structure of Volitional Activity

Psychologists identify the following stages:

1. **Understanding the goal** – realizing the purpose of the work.
   Example: An engineer sets a goal to create a new device or chooses a project direction and plans time.
2. **Overcoming difficulties** – every activity has obstacles; volitional activity manifests in overcoming them.
   Example: An engineer works day and night to correct a calculation error.
3. **Evaluating results** – after achieving the goal, the individual analyzes their work and learns from mistakes.

Volitional Traits and Their Role in Professional Activity

Volitional traits are stable psychological characteristics that help control behavior and overcome difficulties.

Volitional Trait	Description	Example in Engineering
Persistence	Pursuing the goal despite difficulties	Continuing work after failed project tests
Patience	Enduring long-term work	Calmly repeating complex calculations
Responsibility	Understanding consequences of actions	Strictly following safety standards
Self-control	Managing emotional outbursts	Remaining calm in stressful situations
Independence	Making decisions without external influence	Developing new technical solutions independently
Courage	Making decisions in risky or uncertain situations	Taking calculated risks during tests

Volitional traits are closely linked with emotional stability. Strong willpower is the ability to control one's emotions.

Stages of Volitional Decision-Making

Decision-making is central in volitional activity:

1. **Understanding the problem** – analyzing the situation.
2. **Comparing options** – evaluating different solutions.
3. **Choosing a solution** – selecting the optimal approach.
4. **Implementing the decision** – taking action according to the chosen path.
5. **Monitoring results** – analyzing the outcome of the action.

Example: An engineer evaluates several technical options to eliminate a malfunction, selects the safest one, and implements it — demonstrating volitional decision-making.

Importance of Volitional Qualities in Engineering

Engineering requires high responsibility, precision, and patience. Therefore, volitional qualities are crucial for professional success.

Situations where engineers demonstrate volition:

- Overcoming fatigue during long-term projects
- Applying patience and analytical thinking to solve technical issues
- Maintaining compromise in team work
- Making accurate and reliable decisions under time pressure

Ways to develop volitional skills:

- Clearly set goals and achieve them step by step
- Value small successes and increase motivation
- Practice self-control (daily planning, reflection)
- Manage stress and maintain a healthy lifestyle

Conclusion: Willpower is the conscious control system guiding human activity toward goals. Volitional activity manifests in overcoming difficulties, decision-making, and acting with patience and persistence. In engineering, volitional qualities form the foundation of professional stability, responsibility, problem-solving ability, and creativity. Thus, higher education should prepare students not only technically but also volitionally and emotionally.

Summary of Volitional Traits

Volitional traits are stable qualities that manifest in goal-directed activity and shape character. Psychologically, they are based on:

- Understanding goals
- Conscious action
- Overcoming obstacles
- Patience
- Persistence and self-control

These traits ensure goal-oriented behavior and are essential for professional development.

Volitional Traits

Volitional Trait	Description	Example in Engineering
Persistence	Consistency and not giving up in achieving goals	Working day and night on a complex project

Volitional Trait	Description	Example in Engineering
Patience	Enduring difficulties and waiting for results	Continuing despite multiple failed tests
Responsibility	Understanding the consequences of actions and feeling accountable	Following technical safety regulations
Courage	Making correct decisions in risky or uncertain situations	Resolving a malfunction in an electrical system
Self-control	Managing emotional outbursts and maintaining balance	Staying calm under pressure in meetings
Independence	Making decisions without relying on others	Developing a project based on one's own idea
Initiative	Proposing new ideas and being proactive	Suggesting improvements to increase efficiency in the workflow

The combination of these traits forms a strong volitional character in a person.

Factors in the Formation of Volitional Traits

Volitional traits do not appear spontaneously—they are shaped by social, personal, and educational factors.

Key factors:

1. **Family environment**
   - During childhood, parents' example, discipline, and work ethic contribute to developing willpower.
2. **Education**
   - Student years: independent work, timely completion of tasks, and coping with stressful situations strengthen volitional training.
3. **Professional activity**
   - Responsibility at work, leadership, and problem-solving skills consolidate willpower.
4. **Personal motivation**
   - Clarity of goals, aspirations, and values support the development of willpower.
5. **Team environment**
   - Support from colleagues and positive competition encourage volitional growth.

Methods and Stages of Volitional Training

Volitional training is the conscious development of independence, responsibility, patience, and persistence.

Main methods:

1. **Goal setting and planning**
   - Perform every task based on a clear goal and divide it into stages.
     Example: Planning small daily tasks and completing them regularly.
2. **Self-monitoring**
   - Analyze actions and decisions, learn from mistakes.
     Example: Record daily completed tasks and analyze them.
3. **Conscious overcoming of difficulties**
   - Do not avoid challenges; treat them as opportunities for growth.
4. **Discipline and orderliness**
   - Follow a schedule and manage time effectively.
5. **Self-reinforcement**
   - Reward or praise yourself after each small achievement.
6. **Sports and physical exercises**
   - Physical activity is crucial as it develops patience and self-control.

Stages of volitional training:

1. **Understanding stage** — the individual realizes the necessity of willpower.
2. **Practice stage** — volitional traits are tested in real situations.
3. **Stabilization stage** — volitional traits become part of the person's character.

Example: A student plans time for daily study; initially, it requires effort, but gradually it becomes a stable volitional trait.

Importance of Volitional Training in Engineering

Engineering requires high responsibility, technical precision, and stability. Therefore, the following volitional traits are especially important:

- **Persistence and patience** — for solving complex technical problems
- **Responsibility** — for ensuring safety and quality
- **Initiative** — for proposing new ideas
- **Calmness and balance** — for making correct decisions under stress
- **Self-control** — for managing conflicts in team settings

Practical example: An engineer calmly resolves a production accident without giving in to emotions—demonstrating strong volitional traits in practice.

Conclusion: Volitional traits are essential psychological characteristics that ensure goal-directed activity. They develop through self-control, responsibility, persistence, and patience.

Purpose in higher education:

- To cultivate independent and responsible individuals
- To teach resilience in the face of stress and difficulties
- To form internal discipline and stability necessary for engineering

Volitional training is thus an integral part of shaping students into successful, willful, and responsible specialists.

Concept of Volitional Management

Volitional management — the ability to consciously control one's actions, analyze emotions, and direct oneself toward goals. This process relies on willpower, conscious control, and self-regulation mechanisms.

Volitional management includes:

- Controlling emotions (managing anger, fear, frustration)
- Planning actions (organizing activities step by step)
- Assessing situations (analyzing problems and making correct decisions)
- Self-motivation (maintaining motivation)
- Maintaining discipline (adhering to time, obligations, and work rules)

Role of Volitional Processes in Behavior Management

Volitional processes are mental mechanisms that help a person control their actions. They include:

1. **Self-regulation** — the ability to consciously control one's actions and emotions.
   Example: A student calms themselves during stress and focuses attention on the task.
2. **Maintaining motivation** — continuing to act toward a goal despite difficulties.
   Example: An engineer does not stop working until a technical problem is solved.
3. **Volitional decision-making** — choosing the correct path among different options.
   Example: Trying a temporary alternative to solve a project issue.
4. **Self-control (patience and regulation)** — achieving positive results by managing emotional states.

In summary, volitional management transforms a person from being "a slave to emotions" into a conscious, goal-directed individual.

Stages of Volitional Behavior Management

Volitional management is carried out through the following psychological stages:

Stage	Content	Example
1. Understanding the goal	Realizing why the action is being performed	An engineer visualizes the final outcome of a project
2. Decision-making	Evaluating options and selecting the best one	Choosing which technology to use
3. Action implementation	Starting activities according to the selected plan	Executing tasks according to the project plan
4. Overcoming obstacles	Enduring difficulties, fatigue, and errors	Rechecking a test when the result is unexpected
5. Result monitoring	Evaluating results and drawing conclusions	Analyzing mistakes at the end of work and preparing for future tasks

Importance of Volitional Behavior Management in Engineering

Engineering requires high precision, responsibility, and psychological stability. Volitional behavior management is important because:

- **Maintaining calm under stress** — e.g., during a production malfunction
- **Team harmony** — volitional individuals manage problems without conflicts
- **Technical safety** — emotional fatigue or inattention may cause errors
- **Responsible decision-making** — a volitional engineer analyzes problems and anticipates consequences

Practical example: An electrical engineer under high pressure remains calm, follows safety rules, and solves the problem. This demonstrates volitional control in action.

Ways to Develop Volitional Behavior Management Skills

Volitional management is not automatic; it develops through conscious practice. Key methods include:

1. 🎯 **Setting clear goals** — linking each activity to a final outcome
2. □ **Self-reflection** — asking, “Why did I act this way?”
3. □ **Time management** — planning, discipline, and orderliness
4. 🦾 **Self-control exercises** — controlling emotional outbursts via deep breathing or focus shifts
5. 🗣️ **Positive self-talk** — e.g., “I can do this” to motivate oneself
6. □ **Breaking complex tasks into steps** — strengthens persistence
7. □♂□ **Sports, meditation, healthy lifestyle** — enhances psychological stability

Conclusion: Volitional behavior management is a psychological process that organizes conscious activity, emotional states, and decision-making. It is a key factor in social, professional, and personal success.

For engineers, educators, and technical specialists, volitional management allows:

- Enduring stress
- Making correct decisions in challenging situations
- Developing as responsible, stable individuals

In higher education, teaching students volitional behavior management skills is essential for training disciplined, responsible, and volitional specialists.

Concept of Professional Adaptation

Professional adaptation — the process by which an individual adjusts psychologically, socially, and emotionally to new work conditions, tasks, team dynamics, and organizational culture.

Professional adaptation is not only learning work tasks but also finding one’s role in the professional system and manifesting abilities in real activity.

Psychology of professional adaptation studies:

- Professional motivation
- Psychological preparedness for work
- Interaction with the social environment
- Stress and fatigue levels
- Dynamics of professional growth

Example: A newly graduated engineer learning company rules, team requirements, and technical standards is undergoing adaptation.

Psychological Content and Stages of Professional Adaptation

Professional adaptation depends on psychological readiness, motivation, volitional traits, and social experience.

Stages of professional adaptation:

Stage	Content	Example
1. Orientation	Getting familiar with the workplace, team, and conditions	Learning company regulations and production processes
2. Adjustment (psychological and social)	Adapting to the environment and finding one's place	Establishing relationships with colleagues, understanding supervisor expectations
3. Stabilization	Independently performing tasks and gaining confidence	An engineer independently manages a project
4. Integration	Feeling like a full member of the professional system	Showing leadership or creative initiative in the team

Factors Affecting Professional Adaptation

Professional adaptation is influenced by internal (personal) and external (social) factors:

Internal factors:

- Temperament and character
- Volitional and emotional stability
- Level of professional motivation
- Skills and competence
- Self-assessment and confidence

External factors:

- Psychological climate of the team
- Leadership style and organizational culture
- Workplace conditions and technical support
- Incentive systems
- Workload and stress levels

Example: In a healthy team environment, a new engineer adapts quickly and becomes active professionally. In a competitive or high-pressure environment, adaptation slows down.

Common Problems During Professional Adaptation

During adaptation, individuals may face psychological obstacles such as:

- Stress and anxiety — from the desire to prove oneself
- Lack of confidence — due to insufficient experience or critical evaluations
- Decreased motivation — when results are below expectations
- Difficulty integrating into the team — due to communication barriers or conflicts
- Professional burnout — from prolonged psychological stress

Example: A new engineer initially feels pressured to avoid mistakes. Managerial psychological support is crucial to reduce stress.

Importance of Professional Adaptation in Engineering

Engineering requires technical knowledge, attention, responsibility, and teamwork. Professional adaptation ensures:

- Psychological stability
- Professional efficiency
- Successful integration into work environments

Features of Adaptation in the Engineering Profession

Key characteristics of adaptation for engineers:

- Rapid learning of new technologies and software
- Decision-making under technical risk conditions
- Coordination in team-based projects
- Managing stress during work processes
- Emotional stability to ensure technical safety

If adaptation is successful:

- Work efficiency increases
- The employee integrates into the team faster
- Innovative thinking is strengthened
- Psychological fatigue is reduced

Effective Ways to Facilitate Professional Adaptation

To facilitate professional adaptation, educational institutions and employers should create the following psychological conditions:

A. During the student period:

- Correctly choosing a professional direction
- Familiarity with real working conditions during internships
- Psychological preparation for stress
- Developing volitional traits (patience, perseverance, responsibility)

B. After starting work:

- Psychological support from supervisors (mentoring, training)
- Programs for integrating new employees into the team
- Incentives and positive feedback
- Development of team communication

Example: If a company provides an "adaptation program" for new employees, their professional efficiency increases 20–30% faster (according to labor psychology research).

Conclusion

Professional adaptation is the process by which an individual harmonizes psychologically, socially, and emotionally with their profession. When successful, the person experiences:

- Job satisfaction
- Motivation
- Stable performance

In engineering:

- Adaptation reduces stress
- Promotes healthy team relationships
- Creates a foundation for professional growth

Role of higher education institutions:
To prepare students not only as knowledgeable professionals but also as psychologically ready, adaptable, and resilient individuals.

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Ensuring Labor Safety

The health and life of employees are a priority for any organization. Therefore, in labor organization, it is essential to implement:

- Safety techniques
- Fire safety measures
- Special clothing and personal protective equipment
- Regular training sessions

Measures implemented in enterprises:

- Mandatory employee training
- Constant instructions and guidelines
- Installation of safety signs
- Marking potentially hazardous zones

Example: In a chemical plant, workers must wear masks, gloves, and protective clothing, which shields them from harmful substances.

Motivation and Incentives

Effective labor organization is not limited to technical aspects; **psychological and material motivation** of employees is also crucial. Incentives include:

- Salaries and bonuses
- Awards
- Professional development courses
- Recognition from supervisors

Example: Introducing a “Best Employee” contest encourages workers to perform their duties more responsibly.

Advantages of Proper Labor Organization

- Increased production efficiency
- Reduced employee fatigue
- Strengthened labor discipline
- Increased competitiveness of the enterprise
- Improved work quality

Conclusion: Proper labor organization plays a decisive role in any organization's success. It increases productivity, creates a healthy work environment, and contributes to enterprise development. A well-organized labor process enhances competitiveness while maintaining employees' health and psychological well-being, ensuring uninterrupted workflow. Therefore, labor organization remains a key focus in modern management systems.

Recommendations

1. **Ergonomic adaptation of workplaces:** Regularly improve lighting, temperature, noise levels, and ventilation to enhance comfort and health.
2. **Regular analysis of labor processes:** Continuous monitoring and analysis to identify excess movements, wasted time, and production interruptions.
3. **Updating norms and standards:** Adjust labor standards based on technological advances, changing working conditions, and employee skills.
4. **Focus on professional development:** Provide training, retraining, and seminars to increase labor efficiency.
5. **Strengthening material and moral incentives:** Use bonuses, awards, certificates, and incentive programs to boost employee motivation.
6. **Strict adherence to safety rules:** Regular training, adequate safety signs, and mandatory use of protective equipment.
7. **Enhancing teamwork and internal communication:** Effective communication and collaboration promote team unity, responsibility, and discipline.
8. **Implementation of innovative technologies:** Using modern equipment and automated systems simplifies labor processes and saves time.

2. Classification of Workplaces, Organization, Planning, and Service

For efficient labor, workplaces must be properly organized and categorized. Workplace classification helps in planning, increasing productivity, ensuring safety, and creating comfortable conditions. Proper classification is a key aspect of scientific labor organization.

Main criteria for classifying workplaces:

By nature of work:

- **Physical workplaces:** Require mainly physical effort.
  Examples: Construction workers, welders, carpenters, locksmiths, warehouse workers.
- **Mental workplaces:** Employees work with computers, equipment, or documents.
  Examples: Accountants, teachers, engineers, office managers.

By level of automation:

- **Manual workplaces:** The worker performs all tasks manually.
  Example: A lathe operator's station.
- **Mechanized workplaces:** Tasks performed with machines and mechanisms.
  Example: Crane operator's workstation.
- **Automated workplaces:** Equipment works automatically; the worker only supervises.
  Example: Robotized conveyor line.
- **Computerized workplaces:** Tasks performed using computers and software.
  Example: Designer, programmer, accountant workstation.

By equipment type:

- **Stationary workplaces:** Equipment is fixed in one location.
  Example: Metalworking station.
- **Mobile workplaces:** Workstation can move from place to place.
  Example: Electrification repair team's vehicle workstation.

By number of employees:

- **Individual workplaces:** Designed for one employee.
  Example: Tailor's workstation.
- **Team workplaces:** Several employees work together.
  Example: Construction team's common work area.
- **Collective workplaces:** Many employees work in an interconnected zone.
  Example: Car assembly workshop.

By working conditions:

- **Comfortable workplaces:** Hygienic conditions with adequate lighting, temperature, and ventilation.
- **Harmful workplaces:** Presence of harmful substances, noise, or vibration.
  Example: Chemical plants, paint shops.
- **Hazardous workplaces:** Work at heights, high temperatures, or fire risk.
  Example: Metal smelting shops, high-altitude assembly work.

By working time:

- **Permanent workplaces:** Employee always works at the same location.
  Example: Office employee's desk.
- **Temporary workplaces:** Created for a specific project or season.
  Example: Construction site.

Example: Ergonomic chairs, proper lighting, and monitor height for computer workers can increase productivity by 20–30%.

Conclusion on Workplace Classification

Workplace classification is one of the main methods for rational organization and management of labor in an enterprise. A properly classified workplace clearly defines employee responsibilities, increases labor productivity, and ensures safe working conditions.

3. Planning and Servicing Workplaces

To function efficiently, workplaces require regular maintenance and servicing. Planning includes:

1. **Technical maintenance plans**
   – Prevent equipment breakdowns.
   Example: Machines undergo weekly technical inspections.
2. **Provision of materials and tools**
   – Ensure the workflow is not interrupted by timely delivery of required materials.
   Example: A textile factory orders fabric in advance before the current supply runs out.
3. **Cleanliness and discipline at the workplace**
   – Efficiency of work depends on cleanliness and order.
   Example: Laboratory staff keep aisles sterile at all times.
4. **Employee services**
   – Provision of water, lighting, heating, rest areas, and medical services.

Labor Discipline

Labor discipline is the employee's strict adherence to work rules, established procedures, safety regulations, and management instructions.

Factors ensuring labor discipline:

1. **Internal labor regulations** – Working hours, breaks, dress code.
2. **Supervisory control** – Timely task execution and discipline monitoring.
3. **Employee responsibility** – Attitude to work, honesty, time management.
4. **Educational and organizational measures** – Warnings or disciplinary actions for violations.

Incentives for Labor Discipline

Motivation encourages employees to comply with labor discipline.

Types of incentives:

1. **Material incentives** – Bonuses, additional pay, rewards.
   Example: Employee exceeding target by 120% receives a bonus.
2. **Moral incentives** – Certificates of honor, thank-you notes, public recognition.
   Example: "Employee of the Month" award.
3. **Professional incentives** – Training, courses, promotions.
   Example: A workshop supervisor with outstanding results is promoted to section manager.

Working Conditions

Working conditions are external factors affecting the employee's physical and mental state.

Main factors:

1. **Sanitary and hygiene requirements** – Lighting, noise, temperature, dust levels.
2. **Social conditions** – Rest rooms, changing rooms.
3. **Safety conditions** – Protective equipment, marking hazardous zones.
4. **Psychological environment** – Healthy workplace atmosphere, fair management.

Example: Employees in a chemical workshop are required to work in protective masks and gloves.

Labor Standardization

Labor standardization is the scientific determination of the time and resources required to perform a task.

Benefits of standardization:

1. **Increases labor productivity** – Optimal workload is assigned to each employee.
2. **Ensures fair payment** – Wages calculated based on standards.
3. **Creates order in the workflow** – Eliminates unnecessary actions.

4. **Reduces production costs**

Example: If a part assembly is standardized to 12 minutes, the number of products an employee can make per shift can be calculated in advance.

Proper organization, planning, and servicing of workplaces enhance labor productivity, support discipline, and improve production quality. Labor discipline and incentives strengthen order, responsibility, and intellectual approach, while working conditions and labor standardization maintain employee health, manage budgets, and ensure stable production.

4. General Concept of Work Regime

Proper scheduling of employee work and rest is crucial to increase productivity, maintain health, and organize the labor process effectively.

Work regime – A system of norms defining the duration of work activity, breaks, shift rotation, and allocation of working hours. It ensures employees have structured time for work, rest, and recovery, contributing to enterprise efficiency and labor safety.

Components of a work regime:

1. Working hours
2. Shift duration and rotation
3. Breaks
4. Rest days
5. Vacation and additional days off
6. Type of workweek (5- or 6-day)

Main Types of Work Regimes

1. **Regular (normal) working hours**
    - 40 hours per week
    - Usually 5 working days, 2 days off
      Example: Office employee works Monday to Friday, 09:00–18:00, with a 1-hour lunch break.
2. **Reduced working hours**
    - Less than the standard hours for certain categories
      Examples:
        - Teachers: 36-hour workweek
        - Minors (16–18 years): 36-hour workweek
        - Workers in heavy or harmful conditions: 36 hours or less

3. **Flexible (cyclical) regime**
    - Employee arrival and departure are not fixed; daily/weekly norms must be met
      Example: An employee works 8 hours per day, either 08:00–16:00 or 10:00–18:00.
4. **Shift work regime**
    - Used for continuous production
      Example:
        - 1st shift: 06:00–14:00
        - 2nd shift: 14:00–22:00
        - 3rd shift: 22:00–06:00
    - Common in factories, power plants, and healthcare institutions
5. **Cumulative work hours**
    - Used where daily working hours are difficult to define; accounted monthly or quarterly
      Example: Agricultural workers work more during the season, less afterward

Functions of the work regime:

- Protects employee health
- Prevents fatigue
- Increases productivity
- Regulates relations between employee and employer
- Reinforces labor discipline

Consequences of Improper Work Regime

If the work regime is poorly organized:

- Employees become fatigued
- More errors occur
- Production efficiency decreases
- Accidents increase

Breaks During the Workday

- **Lunch break:** at least 30 minutes to 1 hour
- **Technological breaks:** for equipment processes, if needed
- **Rest breaks:** especially important for computer operators

Example: A computer operator should take a 5–10 minute break every hour for eye and body exercises.

Weekly Rest Days

Usually 1 or 2 days (commonly Saturday and Sunday).

Types of vacations:

- Annual paid leave (at least 15 days)
- Additional leave
- Maternity and childbirth leave
- Educational leave

Proper Organization of Work Regime

The enterprise must consider:

- Employees' physical and mental capacities
- Difficulty of working conditions
- Requirements of technological processes
- Occupational safety regulations
- Production schedule

Example: Workers in hot workshops should be given 10–15 minute additional breaks every 2 hours.

Conclusion: A work regime is one of the main factors for organizing labor efficiently and safely. Properly implemented, it increases production indicators, preserves employee health, and strengthens labor discipline.

Psychohygiene and Occupational Fatigue

Psychohygiene – a scientific and practical field aimed at maintaining and strengthening mental health, closely related to psychology, medicine, pedagogy, and sociology. It helps manage mental state, reduce stress, develop a healthy lifestyle, and prevent mental disorders.

Essence of psychohygiene: Maintaining mental balance, reducing psychological strain, supporting emotional stability, and preserving mental health.

Main tasks of psychohygiene:

1. Prevent stress and overload
2. Ensure emotional stability
3. Develop communication skills
4. Organize work and rest correctly
5. Prevent mental illnesses
6. Create a healthy social environment

Main Directions of Psychohygiene

1. **Personal psychohygiene** – managing daily mental state, self-awareness, and self-discipline.

   Examples:

   - Daily planning
   - Adequate sleep (7–8 hours)
   - Moderate use of phone and internet
   - Avoiding conflicts
   - Allocating time for hobbies
2. **Occupational psychohygiene** – studies workplace psychological environment, communication culture, rest routines, and working conditions.

   Examples:

   - 5–10 minute breaks during work
   - Creating a positive communication environment in the team
   - Protecting workspace from noise
   - Resolving conflicts constructively
3. **Educational psychohygiene** – prevents mental fatigue in students, helps focus attention, and increases motivation.

   Examples:

   - Short breaks after 40–45 minutes of lessons
   - Alternating difficult subjects with easier ones
   - Eye exercises during long study sessions
   - Enhancing student motivation
4. **Social psychohygiene** – relates to societal psychological climate, social support, and healthy family and group interactions.

   Examples:

   - Maintaining respect, love, and balance in family
   - Creating a healthy psychological climate in a team

- Supporting youth in the community
- Developing positive communication skills

Principles of Psychohygiene

1. **Maintain mental balance** – emotional stability is the basis for stress resistance.
2. **Healthy lifestyle** – quality sleep, proper nutrition, physical activity, avoiding harmful habits.
3. **Positive thinking** – self-motivation and optimism reduce stress.
4. **Communication culture** – speaking, listening, understanding, and interacting respectfully.
5. **Balance between work and rest** – workload or its lack affects mental state; prolonged stress harms mental and physical health.

Stress reduction methods:

- Breathing exercises
- Meditation
- Short breaks
- Light physical exercises
- Hobbies
- Talking with a psychologist
- Proper planning

Example: A student preparing for an exam can reduce fatigue by studying 25–30 minutes and taking a 5-minute break.

Practical importance of psychohygiene:

- Prevents mental illnesses
- Reduces stress, depression, and anxiety
- Increases productivity in work and study
- Strengthens healthy social relationships
- Develops self-regulation skills

Conclusion: Psychohygiene is essential for maintaining and strengthening mental health. Healthy mental balance is crucial for effective work, study, and life. Applying psychohygiene in daily life improves physical health, mood, and social relationships.

Occupational Fatigue

Occupational fatigue – a state resulting from prolonged psychological, emotional, and physical strain, manifested by reduced interest in work, fatigue, loss of motivation, and emotional imbalance. It is more common in professions that involve working with people (teachers, doctors, psychologists, social workers, police officers, etc.).

Essence of occupational fatigue (burnout): A process where emotional and psychological resources are depleted due to long-term stress and professional pressure.

Main signs:

1. Physical fatigue
2. Emotional exhaustion
3. Loss of motivation
4. Indifference to work
5. Irritability and quick temper
6. Social withdrawal

2. Stages of Occupational Burnout

1. **Enthusiasm stage** – The person approaches work with great passion and puts in all their energy, often overworking.
   Example: A new teacher prepares lessons late at night to provide high-quality teaching to students.
2. **Strain stage** – The workload increases, time becomes insufficient, and anxiety begins.
   Example: A doctor experiences shortened sleep due to many shifts.
3. **Emotional exhaustion stage** – The person feels tired, weak, and irritable. Interest in work decreases.
   Example: A social worker becomes indifferent toward people seeking help.
4. **Complete professional burnout stage** – Dissatisfaction with work, depressive state, restlessness increase, and productivity decreases.
   Example: A teacher goes to class out of obligation and derives no pleasure from teaching.

3. Causes of Occupational Burnout

Excessive workload:

- Too many tasks
- Limited time

- Short-term assignments

Emotional load:

- Solving other people's problems
- Conflicts
- Difficult communication with clients or patients

Improper working conditions:

- Noise
- Inadequate facilities
- Lack of breaks

Insufficient motivation:

- Low salary
- Lack of recognition from management

Personal factors:

- Perfectionism
- Excessive self-demand
- Avoiding conflicts

Prevention of Occupational Burnout

1. **Proper work regime:**

- Balance between work and rest
- Regular breaks
- Quality sleep
  Example: Take a 5-minute break every 1–2 hours.

2. **Stress management skills:**

- Breathing exercises
- Meditation
- Light physical activity

3. **Emotional support and social backing:**

- Conversations with colleagues
- Quality communication with friends and family
- Consulting a psychologist

4. **Increasing motivation:**

- Set clear goals
- Evaluate results
- Self-reward
  Example: A student sets weekly goals and gives themselves a small reward upon achievement.

5. **Healthy lifestyle:**

- Proper nutrition
- Walking or exercising
- Avoid smoking and harmful habits

Strategies for Overcoming Burnout

- **Reprioritization:** Reduce unnecessary tasks and focus on key responsibilities.
- **Saying "No":** Accurately assess personal limits.
- **Improving work conditions:** Ensure proper lighting, quiet, and comfortable workspace.
- **Active recreation:** Walking, music, reading, spending time in nature.
- **Self-psychological support:** Positive thinking and optimistic approach.

Consequences of Occupational Burnout

For the individual:

- Depression
- Insomnia
- Irritability
- Loss of professional satisfaction
- Health deterioration

For the workplace:

- Reduced productivity
- Increased errors
- Negative work environment
- Staff turnover

Conclusion: Occupational burnout is one of the most pressing problems of modern professions. Prolonged stress, excessive workload, and psychological pressure can significantly impair a person's mental health. Prevention requires proper work regime, healthy lifestyle, stress management, social support, and motivation.

11 – Topic: Work Quality and Psychotechnical Issues of Its Organization. Sensomotor Requirements in Labor Activity. Group Work in Engineering.

1. Concept of Work Quality. Psychological Factors Ensuring Work Quality

The success of any organization, its production efficiency, level of service, and competitiveness primarily depend on **work quality**. Work quality refers to the degree to which an employee performs their tasks according to established requirements, standards, and quality norms.

Work quality plays a central role both in production and in service systems. **High-quality work** means achieving high results, minimizing errors, saving time, and increasing efficiency.

Work quality is the degree to which an employee performs their tasks accurately, efficiently, responsibly, quickly, and in accordance with standards and norms.

Criteria for Assessing Work Quality

1. **Accuracy and correctness** – few errors and proper execution of instructions.
2. **Product or service quality** – compliance with consumer requirements.
3. **Timeliness** – meeting deadlines.
4. **Productivity** – amount of work completed per unit of time.
5. **Responsibility and discipline** – seriousness in work and adherence to work discipline.
6. **Adoption of innovations** – effective use of techniques and technologies.

Key indicators include:

- Work accuracy (number of errors, passing quality checks)
- Completeness (full fulfillment of task requirements)
- Speed and efficiency
- Creativity level
- Service quality (communication, approach, professionalism)
- Active participation in work processes

Factors Affecting Work Quality

Internal factors:

1. Employee skill and competence
2. Professional experience
3. Motivation and incentives
4. Health condition
5. Personal responsibility

External factors:

1. Management control and supervision
2. Working conditions (equipment, safety, tools)
3. Salary and incentive system
4. Team environment
5. Training and retraining programs

Relationship Between Work Quality and Productivity

If **work quality is high**:

- Production costs decrease
- Defective products are reduced
- Time is saved
- Consumer satisfaction increases
- The organization becomes more competitive

If **work quality is low**:

- Errors increase
- Product quality declines
- Losses occur
- The company's reputation suffers

Real-Life Examples of Work Quality

Example 1: Sewing enterprise
Two seamstresses sew the same model:

- Seamstress A follows standards strictly, stitches are even, patterns are correct, minimal errors.
- Seamstress B rushes, stitches uneven, some parts deviate from the pattern.
  Result: Products of A go to export; products of B are sent back for rework.

Example 2: Service sector
A restaurant waiter's work quality includes:

- Politeness
- Speed
- Correct order taking
- Professional interaction with customers
  If the waiter makes mistakes or is rude, service quality is low.

Example 3: Engineering work
An engineer preparing a project drawing:

- Writes measurements accurately
- Applies technical requirements correctly
- Uses modern software
  If not, project errors can lead to significant financial losses.

Ways to Improve Work Quality

1. Regular employee training and skill enhancement
2. Strengthening incentive systems (bonuses, awards)
3. Providing good working conditions
4. Introducing modern equipment and technologies
5. Monitoring and analyzing work processes
6. Proper planning of labor
7. Improving the psychological environment within the organization

Conclusion

Work quality is one of the most important factors that enhance the economic efficiency of an organization. Higher work quality reduces production costs, increases service level, and ensures customer satisfaction. Therefore, organizations must focus on improving employee skills, creating better working conditions, and developing effective incentive systems.

Psychological Factors in Ensuring Work Quality

Work quality is not determined solely by technical capabilities, working conditions, or qualifications. A person's **psychological state, emotional stability, motivation, emotional balance, and attitude toward work** directly affect labor productivity and quality. Therefore, **psychological factors are one of the most important components** in ensuring work quality.

1. Psychological Foundations of Work Quality

During work, a person's mental state affects:

- **Attention and concentration** — reduces errors.
- **Motivation** — increases productivity.
- **Psychological stability** — maintains quality even in difficult situations.
- **Emotional state** — directly affects service quality.
- **Communication skills** — determine the effectiveness of teamwork.

Thus, work quality is directly linked to psychological factors.

2. Key Psychological Factors in Ensuring Work Quality

1. **Motivation** — the internal drive that encourages an employee to work. High motivation leads to:
    - Responsibility
    - Engagement and dedication
    - Creativity
    - Striving for high quality

Example: A tailor receiving a bonus will strive not only to produce a high quantity but also to maintain product quality.

2. **Stress Resistance** — stress is the main enemy of work quality. Stress-resilient employees:
    - Make fewer mistakes
    - Handle situations correctly
    - Complete tasks on time

Example: A bank cashier calmly and efficiently serves many clients without errors.

3. **Emotional Intelligence** — the ability to manage one's emotions and understand others' emotions. This skill improves work quality in:
    - Customer service
    - Teamwork
    - Leadership

Example: An office manager calmly handles a dissatisfied client, improving service quality.

4. **Attitude Toward Work** — the socio-psychological environment shapes employees' work attitude. A positive attitude enhances:
    - Quality

- Speed
- Creativity

Example: A carpenter who enjoys his work handles wood with care, ensuring high quality.

5. **Attention and Thinking Processes** — the speed of thinking, concentration, and analytical skills determine work quality. Focused employees:
   - Make fewer mistakes
   - Work accurately
   - Achieve high productivity

Example: An electrician thoroughly checks each connection, ensuring quality.

6. **Psychological Environment in the Team** — a healthy work environment significantly improves work quality. This includes:
   - Cooperation
   - Mutual respect
   - Support
   - Conflict prevention

Example: A team that helps each other completes work quickly and efficiently, while a conflict-prone team performs poorly.

3. Psychological Factors Negatively Affecting Work Quality

- Stress and anxiety
- Fatigue, burnout
- Low motivation
- Depression
- Conflicted team environment
- Lack of interest in work
- Perceived unfairness at work

These factors drastically reduce work quality.

4. Psychological Measures to Improve Work Quality

1. **Enhancing the Incentive System**
   - Material and moral rewards
   - Recognition
   - Opportunities for professional growth
2. **Psychological Training**

    - Stress management
    - Communication skills
    - Teamwork
3. **Creating a Supportive Work Environment**
    - Fair management
    - Friendly team
    - Open communication
4. **Proper Task Allocation**
    - Assigning tasks according to employee's abilities and temperament
5. **Opportunities for Rest and Recovery**
    - Breaks
    - Access to psychological support

Conclusion

The psychological factors that ensure work quality include a person's mental state, motivation, emotional stability, team relationships, and stress resistance. If these factors are positive, work quality improves, productivity increases, and errors decrease. Therefore, organizations should pay attention not only to technical but also to psychological factors, providing employees with **mental support and motivation**.

Occupational Safety. Causes of Accidents, Their Types, and Prevention of Errors

Occupational safety is a set of organizational, technical, sanitary-hygienic, and psychological measures aimed at protecting the life and health of employees during work.

Creating **safe working conditions** is one of the organization's primary tasks, directly affecting production efficiency and stability.

1. Main Goal of Occupational Safety

The primary goals of occupational safety are:

- Preventing accidents in the workplace
- Preserving employees' health
- Eliminating or reducing hazardous factors
- Promoting a culture of safe work practices

2. Key Ways to Achieve Occupational Safety

1. **Ensuring Technical Safety**
   Proper functioning of technical protective devices is a crucial factor for safety.
   Measures include:
   - Regular inspection of equipment and machinery
   - Use of protective devices (barriers, brakes, sensors)
   - Compliance with electrical safety rules
   - Fire safety systems (alarms, extinguishers)

   Example: Removing safety covers on machines can lead to hand injuries. Operating equipment without protective covers is strictly prohibited.

2. **Training and Instruction of Employees**
   Proper training is one of the most effective ways to ensure safety. Types of instruction include:
   - Initial instruction
   - On-the-job instruction
   - Refresher instruction
   - Additional instruction

   Employees who are trained can:

   - Anticipate hazardous situations
   - Follow correct procedures
   - Protect themselves in emergencies
3. **Use of Personal Protective Equipment (PPE)**
   Each employee must be provided with PPE appropriate for their work.
   Types of PPE:
   - Helmet, gloves, special clothing
   - Respirator or mask
   - Dielectric footwear
   - Safety glasses
   - Ear protection

   Example: Working with chemicals without a respirator can cause serious health damage.

4. **Compliance with Sanitary and Hygienic Standards**
   A clean and healthy work environment improves occupational safety.
   Measures include:
   - Ventilation systems
   - Adequate lighting
   - Controlling dust and harmful substances
   - Maintaining proper water and temperature conditions

Example: Without cooling stations and drinking water in a hot workshop, workers risk heatstroke.

5. **Strengthening Organizational Measures**
   Organizational measures allow systematic management of safety. Measures include:
   - Marking hazardous zones
   - Using safety signs
   - Ergonomic workplace organization
   - Implementing control and audit systems
   - Enforcing labor discipline

   Example: If a forklift exceeds the speed limit of 5 km/h in a warehouse, the risk of accidents increases.

6. **Creating a Psychologically Safe Environment**
   Safety is not only about technical measures but also psychological balance. Measures include:
   - Developing employees' stress resistance
   - Preventing fatigue and overwork
   - Preventing conflicts in teams
   - Regular assessment of employees' psychological state

   Example: A stressed operator may mismanage equipment, causing serious malfunctions.

7. **Accident Prevention and Monitoring**
   Continuous analysis and monitoring of safety are required in every enterprise. Measures include:
   - Identifying hazardous situations
   - Implementing preventive actions
   - Statistical analysis
   - Investigating accident causes and preventing recurrence

3. Principles of Occupational Safety

- **"Safety First"** — safety takes priority over all other processes.
- **Prevention** — eliminating hazards before they occur.
- **Responsibility** — both management and employees are accountable for safety.
- **Systematic Approach** — continuously improving safety measures.

Conclusion

Achieving occupational safety is a **complex process** that requires a combination of technical, organizational, psychological, and sanitary-hygienic measures. In workplaces with safe conditions, accidents are reduced, production efficiency increases, and employees perform their work more confidently and satisfactorily.

Causes of Accidents, Their Types, and Methods for Identifying and Eliminating Them

In the production process, **accidents** (failures, technical breakdowns, emergencies) can cause significant material damage, injuries, and halt production. The causes of accidents are related to multiple factors, and scientifically analyzing, identifying them in a timely manner, and eliminating them is a key aspect of occupational safety.

1. Causes of Accidents

There are three main groups of factors leading to accidents:

1. Technical Causes

- Malfunctions due to worn-out equipment
- Incorrect adjustment of mechanisms
- Design flaws
- Electrical system failures
- Untimely maintenance

Example: If the bearings on a machine are not replaced on time, overheating will cause the equipment to fail.

2. Human (Subjective) Factors

- Employee negligence
- Violation of instructions
- Decreased attention
- Stress or fatigue
- Lack of qualification
- Risky behavior

Example: A worker removes a protective cover and operates the equipment in an unsafe mode.

3. Organizational Factors

- Violation of occupational safety regulations
- Inadequate supervision by management
- Lack of training on instructions
- Improper workplace organization
- Hazardous zones not marked

Example: If the paths for forklifts inside the warehouse are not marked, the risk of collisions increases.

2. Types of Accidents

1. **Technical Accidents**

- Failure of mechanical parts
- Breakage of electrical circuits
- Failure of transformers, motors, or pumps

2. **Technological Accidents**

- Incorrect production mode
- Violation of technological process parameters (temperature, pressure, speed)

3. **Fire and Explosion Accidents**

- Leakage of flammable substances
- Gas accumulation
- Electrical short circuit

4. **Environmental Accidents**

- Chemical spills
- Discharge of wastewater exceeding limits

5. **Transport Accidents**

- Incidents involving forklifts, conveyors, or lifting equipment

3. Methods for Identifying Accident Causes

Several scientific approaches are used to identify the causes of accidents:

1. Analytical Method
This method studies the causes of accidents through logical analysis, diagrams, and structural analysis. Examples include:

- "5 Why" — identifying the cause by asking "why" five times.
- Fault Tree Analysis (FTA)
- Failure Modes and Effects Analysis (FMEA)

Example: Why did the engine burn?

1. The bearing overheated.
2. It was worn out.
3. It was not replaced on time.
4. Maintenance schedules were not followed.
5. No supervision was carried out.

Thus, the primary cause is identified as an organizational deficiency.

2. Statistical Method
The statistical method is based on collecting and analyzing data about accidents. Key tools include:

- Accident frequency statistics
- Identifying trends
- Probability analysis
- Graphs and charts

Example: If a department experiences five instances of wire overheating per month, statistical analysis will help identify the causes, such as excessive load or malfunctioning cooling systems.

3. Experimental Method
This method identifies causes by recreating the accident situation, modeling, and conducting experiments. Methods include:

- Laboratory tests
- Computer simulations
- Virtual accident simulations

Example: To determine what caused the pressure increase in a gas cylinder, an experiment is conducted in a laboratory setting.

4. Ways to Eliminate Accidents

1. Technical Measures

- Replacing faulty parts
- Restoring protective devices
- Reconfiguring equipment

- Implementing automatic shutdown systems

2. Organizational Measures

- Updating safety instructions
- Strengthening supervision
- Retraining employees
- Reorganizing workplaces

3. Preventive Measures

- Providing scheduled technical maintenance
- Marking hazardous zones
- Conducting preventive inspections

5. Types of Error Actions

Error actions are deviations from the established rules, instructions, or technological requirements, carried out by employees. These can be categorized as follows:

1. Carelessness Errors

- Lack of attention
- Superficial approach to work

2. Errors Due to Lack of Knowledge

- Lack of instruction
- Misunderstanding instructions

3. Technical Errors

- Pressing the wrong button
- Incorrect selection of speed or temperature

4. Disciplinary Errors

- Deliberately violating rules
- Not using personal protective equipment (PPE)

5. Psychological Errors

- Stress, fatigue, nervousness
- Hurry

6. Ways to Eliminate Error Actions

- Regularly training and improving employee qualifications
- Updating instructions and safety rules
- Improving the psychological environment within teams
- Reducing stress and fatigue
- Strengthening the supervision system
- Using automatic safety sensors

Conclusion

The causes of accidents are related to technical, human, and organizational factors. They can be identified in a timely manner using analytical, statistical, and experimental methods. Error actions increase the risk of accidents, so to eliminate them, it is necessary to train employees, strengthen supervision, and use protective measures. As a result, accidents decrease, production safety improves, and the organization operates more stably.

Professionally Important Qualities in Labor Activity

Every profession imposes its own specific requirements. To perform professional activities successfully, a person needs not only knowledge and skills but also professionally important qualities, psychological stability, abilities, and adaptability. These factors complement each other and serve as key criteria for labor efficiency.

1. Concept of Professionally Important Qualities

Professionally important qualities are personal traits, psychological characteristics, and behavioral features that allow effective performance in a particular profession.

Such qualities include:

- Responsibility
- Discipline
- Independent thinking
- Concentration
- Accuracy
- Communication culture
- Initiative

- Patience
- Speed and thoroughness

Examples:

- Accountant – accuracy, attention, organization
- Teacher – communication, patience, pedagogical tact
- Driver – attentiveness, quick reaction

2. Abilities in Labor Activity

Ability is a psychological characteristic that allows a person to perform a certain activity easily and effectively.

Abilities are divided into two groups:

1. General Abilities – necessary in any activity:

- Thinking (logical, abstract, creative)
- Memory
- Attention and observation
- Imagination
- Communication ability
- Organizational skills

Example: An employee in any field must be able to concentrate attention in one place.

2. Special Abilities – specific to certain professions:

- Musician – hearing ability, sense of rhythm
- Designer – spatial imagination
- Surgeon – manual dexterity, precision
- Welder – hand coordination, endurance
- Programmer – systematic thinking, algorithmic reasoning

3. Classification of Professionally Important Qualities

Professionally important qualities can be classified into the following groups:

1. Intellectual Qualities

- Analytical skills

- Quick thinking
- Problem-solving ability

Example: An engineer analyzes a complex diagram and proposes a solution.

2. Emotional-Volitional Qualities

- Patience
- Stability
- Stress tolerance
- Self-control

Example: Medical staff must remain calm in emergencies.

3. Communication Qualities

- Teamwork
- Polite interaction with clients
- Leadership

Example: A sales employee should interact politely with customers.

4. Responsibility and Work Discipline

- Orderliness
- Reliability
- Timely completion of tasks

Example: If a railway dispatcher is even a minute late, train traffic is disrupted.

4. Professional Fitness (Professional Competence)

Professional fitness is the correspondence of a person's physical, mental, psychological, and moral qualities to the requirements of a chosen profession.

Professional fitness depends on:

- Health status
- Temperament
- Personal orientation
- Level of abilities
- Qualification

Example: Being a pilot requires good vision, fast reactions, and determination.

5. Professional Adaptation

Professional adaptation is the process by which an employee adjusts to new working conditions, team, tasks, and technologies. This process usually takes **3–12 months**.

Types of Professional Adaptation:

1. Social Adaptation

- Joining the team
- Adapting to team rules
- Developing communication style

Example: A new employee establishes good relations with the team.

2. Psychological Adaptation

- Reducing stress
- Decreasing anxiety
- Increasing self-confidence

Example: A newly hired teacher may feel nervous at first but gradually becomes confident.

3. Professional Adaptation

- Mastering work methods
- Learning to use technical equipment
- Gaining practical experience

Example: A new operator learns machine operation techniques within 1–2 months.

4. Adaptation to Working Conditions

- Getting used to work rhythm
- Adjusting to shift work
- Accepting physical workload

6. Factors Affecting Professional Adaptation

- Support from management
- Friendly attitude of the team
- High-quality training
- Psychological assistance

- Motivation
- Suitable working conditions

7. Ways to Accelerate Professional Adaptation

- Adaptation programs
- Mentor-apprentice system
- Training sessions
- Team activities
- Gradual skill development
- Positive reinforcement

Conclusion

Professionally important qualities and abilities determine how effectively an employee performs labor activities. Each profession requires specific intellectual, emotional, physical, and communication abilities. Professional adaptation ensures that an employee quickly and effectively integrates into a new working environment. Successful adaptation leads to higher labor quality, increased employee interest in work, and improved production efficiency.

Types of Errors in Labor Activity

Errors made by employees during work often lead to violations of safety rules, malfunctions, accidents, and production stoppages. Such errors are called **“operational errors”** or **incorrect work actions**.

Causes of errors can be **psychological, organizational, or technical**. Correct classification helps prevent errors and determine measures to eliminate them.

1. General Classification of Errors

Errors are generally divided into the following main groups:

1.1. Negligence (Inattention) Errors

These errors occur due to lack of attention, haste, or superficial work.

Characteristics:

- Employee does not fully assess the situation
- Attention is divided

- Tasks are performed hastily

Example: An operator presses the wrong buttons, causing the machine to switch to an incorrect mode.

1.2. Errors Due to Lack of Knowledge or Skills

These occur when an employee is unfamiliar with the work process or misunderstands instructions.

Characteristics:

- Common in new employees
- Occurs when training is insufficient

Example: A new employee starts a machine without safety guards.

1.3. Technical Errors

Mistakes in performing actions, incorrect machine settings, or improper handling.

Characteristics:

- Insufficient physical coordination
- Incorrect sequence of actions
- Low accuracy in hand-foot movements

Example: A welder holds the electrode at the wrong angle, reducing weld quality.

1.4. Disciplinary Errors

Deliberate disregard for rules or negligent attitude.

Characteristics:

- Intentionally breaking rules
- Not using personal protective equipment (PPE)
- Violating workplace order

Example: A worker at height does not wear a safety harness.

1.5. Violations of Technological Instructions

Errors occur when instructions, procedures, or standards are ignored.

Example: Operating a machine at a higher speed than specified in the technical manual.

1.6. Organizational Errors

Result from incorrect assignment of tasks or improper guidance from management.

Example: An operator is overloaded with too many tasks at once, leading to mistakes.

1.7. Psycho-Physiological Errors

Caused by stress, fatigue, nervousness, fear, or mental pressure.

Characteristics:

- Muscle tension
- Decreased attention
- Slowed thinking

Example: A stressed employee presses the wrong button, causing a machine malfunction.

1.8. Team (Communicative) Errors

Occur due to poor communication or incorrect information transfer among team members.

Characteristics:

- Task is misunderstood
- Communication breakdown
- Conflicts arise

Example: One worker thinks the machine is off while another turns it on, causing an accident.

1.9. Improper Handling of Equipment

Mistakes in using equipment incorrectly, overloading, or operating in prohibited modes.

Example: Starting an electric motor when its cooling system is not functioning.

1.10. Improper Use of Safety Measures

Incorrect use of PPE or ignoring safety signs.

Example: Wearing a respirator halfway or using a cloth instead of gloves.

Conclusion

Errors arise due to **psychological factors, low skill levels, technical malfunctions, or organizational shortcomings**. Correct classification of errors enhances labor safety, prevents accidents, and increases production efficiency.

Psychomotor Features in Labor Activity

Psychomotor skills are the coordinated interaction between mental processes (perception, memory, attention, thinking) and physical actions (motor skills). They are critical in labor because each work action is controlled by mental processes.

Key Psychomotor Features:

1. **Accuracy of Movements**
    - Precision of hands and fingers
    - Essential in technical work (welder, lathe operator, surgeon)
2. **Speed of Movements**
    - Necessary in professions requiring quick reactions (driver, operator)
3. **Coordination**
    - Eye-hand, hand-hand, foot-hand coordination
    - Important for athletes and operators

4. Reaction Time

- **Signal processing speed** – how quickly an operator perceives and reacts to signals.
- **Critical in emergencies** – essential for immediate response in hazardous situations.

5. Movement Stability

- Ability to perform **repeated actions consistently**.
- Important for professions like **tailors, locksmiths, and precision workers**.

6. Stability of Psychical Control

- Ability to work **despite stress, fatigue, or external factors**.

2. Sensomotor Components of Labor Activity

Sensomotor skills refer to the interconnection between sensory (sensor) processes and motor (movement) processes.

In the workplace, a human performs tasks via the **sensomotor system** by:

- Seeing
- Hearing
- Sensing/touching
- Evaluating situations
- Executing movements

These processes are interconnected.

Key Sensomotor Components

1. **Sensor Components**
    - **Vision:** color, shape, distance, light
    - **Hearing:** signals, warnings
    - **Tactile perception:** feeling objects by hand
    - **Proprioception:** awareness of body position
2. **Motor Components**
    - Hand movements
    - Finger dexterity
    - Whole-body movements
    - Physical effort and strength
3. **Sensor → Motor Link**
    - Humans perceive signals and perform corresponding actions.
      Examples:
    - Operator sees a signal light → presses a button
    - Surgeon sees an image → performs precise cutting

- Driver hears a horn → presses brakes

Psychological Requirements for Tools and Equipment Placement

Workplaces must adhere to **ergonomic principles** to reduce fatigue, prevent errors, and improve work quality.

Psychological Requirements for Equipment Placement

1. **Visual Zone Requirements**
   - Important displays at eye level
   - Adequate lighting
   - Text and symbols must be easily readable
2. **Reach Zone**
   - Frequently used tools within arm's reach
   - Rarely used items can be placed higher or farther
3. **Body Posture Requirements**
   - No excessive strain on shoulders or wrists
   - Natural sitting or standing position
   - Adjustable chair height
4. **Panels and Control Layout**
   - Buttons clearly labeled
   - Color-coded by function
   - Important buttons larger
5. **Noise and Distraction Reduction**
   - Noise level ≤ 60–70 dB
   - Avoid reflective surfaces that strain the eyes
6. **Safety Requirements**
   - Hazard zones clearly marked
   - Emergency stop button within reach

Human and Operator Activity

Human activity – a conscious process aimed at changing the environment purposefully.

Types of human activity:

- Intellectual
- Physical
- Sensomotor
- Creative
- Social

Operator activity – a person controlling a technical system.

Operator Activity Steps

1. Information acquisition (sensor stage)
2. Analysis (perception, thinking)
3. Decision-making
4. Execution (motor stage)
5. Monitoring results

Operator objectives:

- Manage technological processes **safely, quickly, and accurately**
- Prevent accidents
- Increase efficiency
- Maintain quality

System (Tizim) Concept

A **system** is a set of interconnected elements serving a common goal. In labor psychology, system components include:

1. Human (operator)
2. Technical tools (equipment)
3. Information (signals, indicators, control)
4. Environment (light, noise, temperature)

Proper integration of these elements determines work efficiency.

Classification of Operator Activity

By Type of Signals

- **Visual operator:** monitors and panels
- **Vestibular/tactile operator:** mechanical controls
- **Auditory operator:** acoustic signals

By Task Type

- **Monitoring operator:** observes processes
- **Controlling operator:** supervises and manages
- **Combined operator:** monitoring + control

By Level of Automation

- Manual control operator
- Semi-automatic operator
- Automated system operator
- Robotic system operator

By Reaction Speed

- High-speed operations (aviation, dispatch)
- Slow-changing systems (laboratory, technical monitoring)

By Hazard Level

- High-risk production operators (nuclear, chemical)
- Medium-risk systems (transport)
- Relatively safe systems (information systems)

Conclusion on Psychomotor and Sensomotor Skills

Psychomotor and sensomotor abilities are key psychological components of labor activity.

- **Ergonomic placement of tools and equipment** directly affects employee efficiency, safety, and health.
- **Operator activity** relies on complex psychological processes: perception, analysis, decision-making, and execution of actions.
- **Systematic approach** studies the interaction of the operator with technology and the environment.

These insights help **improve work processes, reduce errors, and enhance safety**.

1. Concept of a Group

A **group** is a collection of people interacting with each other, united by a common goal, mutually influencing one another.

Key Characteristics of a Group

1. **Interaction** – members affect each other's behavior.
2. **Common goal** – all members work toward the same objective.
3. **Rules and norms** – established behavioral standards within the group.
4. **Social cohesion** – members recognize each other and establish social roles.

Example: A team of 5–6 employees in a workshop forms a small group with the goal of completing work **efficiently and on time**.

Social-Psychological Issues in Work Teams

Social-psychological issues relate to relationships, communication, collaboration, and decision-making processes within a group.

Key Social-Psychological Characteristics of Work Teams

1. **Trust and mutual respect** – recognition of each other's skills.
2. **Collaboration** – joint effort toward common goals.
3. **Team spirit** – motivation, positive attitude, and support.
4. **Social norms** – adherence to work rules and habits.
5. **Communication effectiveness** – clear and understandable information exchange.
6. **Conflict management** – constructive resolution of disagreements.

Group Activity Management

Group activity management coordinates members' work, allocates resources, and ensures goal achievement.

Principles of Group Management

1. **Define goals and paths to achieve them**
    - Assign tasks to each member
    - Set deadlines and expected outcomes
2. **Define roles**
    - Leader, performers, advisor, coordinator
    - Roles organize and structure group work
3. **Motivation and incentives**
    - Engage members with interest and initiative
    - Use rewards, recognition, and incentives
4. **Organize communication**
    - Ensure clear information transfer
    - Discuss proposals and ideas
5. **Conflict management**
    - Resolve conflicts constructively
    - Respect members' opinions
6. **Monitoring and evaluation**
    - Track task completion
    - Analyze outcomes and draw conclusions

Types of Groups

1. By Purpose

- **Work group** – organized to accomplish a common task (employee team)
- **Social group** – formed for personal relationships and friendship (hobby, club)
- **Technical/working group** – manages or monitors technical processes

2. By Structure

- **Formal group** – created and directed by leadership
- **Informal group** – arises from voluntary member interactions

3. By Social-Psychological Features

- **Collaboration-oriented group** – members support each other
- **Competition-oriented group** – members compete to strengthen their position

4. By Function

- **Executive group** – performs tasks
- **Consultative group** – advises and develops decisions
- **Coordinating group** – organizes resources and processes

Work Activity Issues in Groups

1. Task allocation – each member knows their responsibilities
2. Effective communication – clear and understandable exchange
3. Collaboration and support – members help each other
4. Conflict resolution – disputes do not reduce productivity
5. Motivation and incentives – increase members' engagement
6. Evaluation – continuous analysis of group efficiency

Conclusion on Groups

A group is a **social unit united by a common goal**.

Effective work teams require:

- Trust and respect among members

- Clear task allocation
- Efficient communication
- Constructive conflict resolution

Managing group activity enhances production efficiency and strengthens employees' motivation.

12 – Topic: Decision-Making in Engineering Activities

Plan

1. Psychological aspects of decision-making
2. Decision-making at the perceptual level
3. Decision-making at the speech-cognitive level

Introduction

Decision-making is a crucial step in nearly all aspects of human activity – work, study, life, management, or daily routines.

- It involves complex **cognitive, motivational, and emotional processes**.
- Quality of decisions depends on **knowledge, experience, emotional state, character, and social environment**.

This lecture examines **psychological foundations, mechanisms, stages of decision-making**, illustrated with examples.

Definition of Decision-Making

Decision-making – the process of selecting the most optimal option from several alternatives in a given situation.

Stages of decision-making:

1. Define the goal
2. Understand the problem
3. Collect information
4. Evaluate options
5. Make a choice
6. Monitor results

Example: A student chooses between two universities by evaluating:

- Tuition costs
- Quality of education
- Living conditions
- Job prospects after graduation

In this process, the student compares **needs, values, and possibilities** to make a decision.

Psychological Mechanisms of Decision-Making

Decision-making occurs through the **coordination of mental processes**. Key mechanisms include:

1. Cognitive Mechanisms

Cognitive processes—**perception, memory, thinking, analysis, and synthesis**—play a leading role in decision-making.

Example: When a person wants to buy a new phone, they compare information about various models. Past experiences stored in memory also influence the choice.

2. Emotional Mechanisms

Human emotions can **accelerate or slow down decision-making**. Strong emotions may also limit logical thinking.

Example: Fear may prevent an investor from funding a risky but potentially profitable project.

3. Motivational Mechanisms

Decisions are shaped by a person's **needs, desires, and values**.

Example: In career choice, young people often select based on:

- **Intrinsic motivation** – they enjoy the profession
- **Extrinsic motivation** – higher salary

Psychological Factors Affecting Decision-Making

1. **Personality**
    - Confident and determined individuals decide quickly
    - Hesitant or anxious individuals delay decisions
2. **Stress**

    - Stress can lead to **hasty or impulsive decisions**
    - *Example:* A nervous student may select even an easy answer incorrectly during an exam
3. **Group Pressure (Conformism)**
    - Opinions of others strongly influence choices
    - *Example:* Young people may follow the career path most friends choose
4. **Pre-formed Stereotypes**
    - Stereotypes can interfere with objective evaluation of options

Stages of Decision-Making

1. **Problem Identification** – Understand the true nature of the issue
2. **Information Gathering** – More information increases decision accuracy
3. **Analysis of Options** – Compare advantages and disadvantages of each choice
4. **Selecting the Optimal Option** – Choose the decision best aligned with personal needs
5. **Implementation** – Put the decision into action
6. **Evaluation of Results** – If successful, the strategy is correct; if not, revise

Types of Decisions

1. **Logical (Rational) Decisions** – Based on information analysis, calculations, and comparison
    - *Example:* Manager chooses an optimal supplier to minimize costs
2. **Intuition-Based Decisions** – Quick, experience-based, often emotional
    - *Example:* Experienced doctor diagnoses a patient by observation
3. **Group Decisions** – Achieved through team discussion and consensus
4. **Automated (Habitual) Decisions** – Routine choices in daily life
    - *Example:* Choosing a route to work or buying bread

Psychological Errors in Decision-Making

1. **Cognitive Illusions**
    - *Confirmation bias* – seeking only information that confirms one's view
    - *Anchoring effect* – over-relying on initial information
2. **Overconfidence** – Overestimating one's knowledge
3. **Emotional Errors** – Emotions cloud judgment, leading to illogical choices

- *Example:* Anger or excessive happiness leading to poor business or investment decisions

Ways to Improve Decision-Making

- Increase information before making a choice
- Compare options in writing
- Manage emotional state (breathing exercises, mindfulness)
- Consult experts
- Increase the number of alternative options
- Analyze outcomes of previous decisions

Conclusion

Decision-making is a **complex psychological process** arising from the integration of thinking, feeling, and action. **Quality decisions** result from the alignment of:

- Knowledge and experience
- Emotional balance
- Logical analysis
- Motivational factors

In modern society, every professional, manager, or individual must **develop effective decision-making skills**.

2. Perceptual-Level Decision-Making

Decision-making is influenced not only by logical thinking but also by **initial perceptual processes**.

Perceptual Level

This level involves **receiving, processing, and interpreting sensory information** from the environment. Many decisions are formed **unconsciously at this perceptual level**.

Perceptual Process (Perception)

Perception – transforming sensory inputs into coherent mental representations.

- Accept sensory data
- Compare with familiar patterns

- Rapid assessment
- Form preliminary decisions or reactions

Key Feature: Perceptual decisions are often made in **seconds or even milliseconds**.

Psychological Basis of Perceptual-Level Decisions

1. **Sensomotor Mechanism** – Humans acquire information through **sight, hearing, smell, touch, and balance**. Decisions can occur **before conscious processing**, based on reflexive sensomotor responses.

Example: A driver immediately brakes when seeing a child run onto the road.

- This is **not a logical choice**, but a **perceptual reflex-based decision**.

2. Categories of Perception

Humans receive numerous signals every day. By **categorizing them**, rapid decisions can be made.

Example:

- Red light → stop
- Increasing noise → possible danger

In these cases, the person does **not consciously analyze** the situation but makes an **automatic decision based on perception categories**.

3. Subconscious Mechanisms

- Previous experiences, memory traces, and stereotypes facilitate **rapid formation of perceptual decisions**.
- **Example:** Seeing an aggressive facial expression, a person automatically keeps distance without conscious analysis.

Stages of Perceptual-Level Decision-Making

1. **Stimulus Detection** – Signals arrive from the environment (sight, sound, etc.).
2. **Preliminary Coding** – Signals are compared with familiar categories at the subconscious level.

3. **Rapid Assessment** – Quick micro-thoughts emerge:
    - "Is there danger?"
    - "Is this familiar?"
    - "Is a reaction needed?"
4. **Initial Decision (Reaction)** – Fast, automatic, and usually emotion-free.

Characteristics of Perceptual Decisions

- Form **very quickly** (0.2–0.5 seconds)
- Minimal conscious participation
- Strongly influenced by experience
- Not entirely free of emotion (fear, surprise)
- Prone to errors (misinterpretation)

Factors Affecting Perceptual-Level Decision-Making

1. **Attention Level** – Determines which signals are treated as important.
    - *Example:* A tired driver notices road signs slower → decision delayed
2. **Experience** – Experienced individuals make more accurate perceptual decisions
    - *Example:* A skilled doctor quickly assesses illness severity from a patient's appearance
3. **Emotional Background** – Emotions may distort or enhance perceptual processing
    - *Example:* Fear → interpreting sounds as dangerous
4. **Stereotypes** – Can influence the perception process

Perceptual Illusions and Their Effects on Decisions

- **Perceptual illusions** occur when perception does not match reality.
- **Visual illusions:** Misjudging distance may lead to incorrect speed decisions
- **Auditory illusions:** Misinterpreting sounds as dangerous, causing unnecessary fear

Examples in Daily Life

1. **Driving:** Braking when seeing a pedestrian suddenly
2. **Communication:** Deciding whether to continue conversation based on facial expressions

3. **Food selection:** Rejecting spoiled food by smell
4. **Safety situations:** Interpreting explosion sounds as immediate danger

Advantages

- Speed → protects from danger
- Efficiency through experience → especially useful for specialists
- Saves cognitive resources

Disadvantages

- Can be based on stereotypes
- Prone to errors
- Lacks conscious analysis

Improvement Methods

- Attention exercises
- Reflex and rapid response training
- Increased real-life practice
- Stress management
- Developing peripheral senses

3. Speech-Cognitive Level Decision-Making

Decision-making at this level relies on **complex cognitive processes**: thinking, memory, perception, attention, and imagination. At this stage, a person:

- Analyzes problems
- Compares alternatives
- Forms opinions through **inner speech**
- Makes **conscious and rational choices**

Speech-Cognitive Level Overview

- Most **conscious and rational stage** of decision-making
- Unlike perceptual decisions, it involves **deliberate and sequential mental operations**

Definition

The speech-cognitive level involves:

- Forming thoughts through **inner speech**
- **Analyzing information**
- Drawing conclusions
- Making a **conscious and reasoned choice**

Decisions here rely more on **logical analysis, information processing, and linguistic expression** rather than emotions.

Key Features

- Sequential thinking
- Logical reasoning
- Inner speech (self-talk)
- Analytical comparison
- Categorization and conceptualization

Psychological Foundations of Speech–Cognitive Processes

Speech–cognitive decision-making relies on several **key psychological mechanisms**:

1. **Inner Speech**
    - Inner speech is a person's **internal dialogue with themselves**.
    - In decision-making, it serves as a **mediator for thinking**.
    - **Example:** A student deciding between work and study may think: *"If I work, I'll earn money, but I'll have less time for studies. If I study, I can get a better job in the future."*
    - Through inner speech, the person **compares different options**.
2. **Analytical Thinking**
    - Logical analysis of alternatives, identifying cause–effect relationships, relying on evidence.
    - **Example:** A production manager calculates that purchasing new technology will increase efficiency by 20%—a **rational, analytical decision**.
3. **Categorization and Conceptual Operations**
    - People generalize information using **concepts** and operate with them.
    - **Example:** A person believing "cheap products may be low quality" chooses a higher-quality, slightly more expensive option.

Stages of Speech–Cognitive Decision-Making

1. **Verbal Expression of the Problem**

    - The individual expresses the problem in words:
      "Which field should I study?"
2. **Conscious Information Gathering**
    - Searching, reading, and analyzing relevant information.
3. **Information Processing**
    - Comparing, differentiating, generalizing, and weighing evidence and counter-evidence.
4. **Inner Dialogue**
    - Questions like:
      "Is this option suitable for me?"
      "Which one is more beneficial?"
      "What will the long-term outcome be?"
5. **Formulation of Decision in Speech**
    - The decision is expressed internally or verbally:
      "I will study philology."
6. **Decision Implementation**
    - Planning, registration, submitting documents, etc.

Characteristics of Speech–Cognitive Decisions

1. **Conscious and Deliberate** – based on data, evidence, and analysis.
2. **Dominance of Logical Thinking** – relies on facts rather than emotions.
3. **Goal-Oriented and Planning-Based** – serves long-term objectives.
4. **Active Participation of Inner Speech** – self-questioning, reflection, and option evaluation.
5. **Linked to Written and Spoken Language** – sometimes includes written analysis, tables, or diagrams.

Examples

1. **Career Choice**
    - A student asks:
      "Which profession do I like?"
      "Which careers are in demand?"
      "Which field should I study?"
    - Solved through **inner speech**.
2. **Business Strategy**
    - An entrepreneur thinks:
      "If I reduce the price by 10%, sales will rise 30%, but profit may fall."
    - Makes an **optimal pricing decision** using calculations.
3. **Time Management for Students**

- *"Today I'll write notes, tomorrow I'll work on a test, Monday I'll prepare a presentation."*
- A **planning-based cognitive decision**.

4. **Social Communication Decisions**
   - During conversation, a person decides:
     "If I say this, will they be upset?"
     "How can I explain this politely?"
   - Also involves **speech–cognitive processing**.

Factors Affecting Speech–Cognitive Decisions

1. **Intelligence** – broader thinking leads to higher-quality decisions.
2. **Memory Capacity** – recalling past experiences improves decision accuracy.
3. **Language Proficiency** – richer vocabulary makes expression and analysis easier.
4. **Attention** – scattered attention can disrupt decisions.
5. **Knowledge Base** – more knowledge → more alternatives → better-founded decisions.

Common Psychological Errors

1. **Confirmation Bias** – only seeking information that supports one's existing opinion.
2. **Overgeneralization** – drawing broad conclusions from a single case.
3. **Logical Errors** – unclear concepts, incorrect comparisons.
4. **Emotional Arguments** – basing decisions on likes/dislikes rather than logic.
   - *Example:* A student thinks: *"I don't like this subject, so I won't need it in the future."*

Ways to Improve Speech–Cognitive Decisions

- Analytical thinking exercises
- Working with scientific texts
- Developing planning habits
- Writing summaries, annotations, and notes
- Comparing alternatives in writing
- Conscious control of inner speech (metacognition)
- Developing critical thinking

Conclusion

Speech–cognitive decision-making is **the most conscious, logical, structured, and reflective form of decision-making**.

- It involves **analyzing facts**, **processing information through speech**, and **evaluating options via inner dialogue**.
- Quality depends on **language skills, clarity of thought, knowledge, and logical reasoning**.
- In modern education and management, **speech–cognitive decisions** are among the **most effective and reliable types of decisions**.

REPUBLIC OF UZBEKISTAN
MINISTRY OF MINING INDUSTRY AND GEOLOGY
NAVOI STATE UNIVERSITY OF MINING AND TECHNOLOGIES
Faculty of Chemistry and Metallurgy

Registered:
No. _____
Date: “____” _____ 2025

APPROVED BY:
Rector of Navoi State University of Mining and Technologies
_____ B.T. Mardonov
Date: “____” _____ 2025

COURSE SYLLABUS
Engineering Psychology

Educational Programs (Majors):

- 60720800 – Mining Engineering
- 60710400 – Power Engineering
- 60720400 – Technological Machines and Equipment
- 61020200 – Labor Protection and Industrial Safety

Navoi – 2025

The syllabus of the course has been developed in accordance with the instructions of the President of the Republic of Uzbekistan at the expanded meeting held on **June 20, 2024**. This syllabus is aimed at further enhancing the students' independent learning skills in the course of **Engineering Psychology** for technical majors at Navoi State University of Mining and Technologies. The syllabus is based on the model course content of **Engineering Psychology** in the Republic of Uzbekistan as well as curricula developed at leading foreign universities, including **M.V. Lomonosov Moscow State University**.

The syllabus was approved by the **Minutes No. _____** of the meeting held at NSUMT in **202_**, on "____" _____.

Prepared by:
O.R. Shamiyeva
Associate Professor, PhD
Department of Social and Humanitarian Sciences and Physical Education
Navoi State University of Mining and Technologies

The syllabus was reviewed at the meeting of the **Department of Social and Humanitarian Sciences and Physical Education** in **2025**, on "____".

Head of Department: Sh.S. Norov

Recommended for use by the **Scientific-Methodological Council of the Faculty of Chemistry and Metallurgy** at the meeting held in **2025**, No. _____.

Dean of Faculty: S.Sh. Sharipov

The department's educational and methodological documents were considered and approved at the **University Scientific Council** on "**" _____ *2025, Minutes No. "***".

Agreed by:
Head of Educational and Methodological Department: I.A. Karimov

Course/Module Code: MP3504 or MP3604	Academic Year 2025-2026	**Semester:** 3/4	**ECTS Credits:** 4	
Course/Module Type: Elective	**Language of Instruction:** Uzbek/Russian		**Weekly Contact Hours:** 3	
1.	Course Title	**Audience training (clock)**	**Independent study (hours)**	**Total load (hour)**
	Engineering psychology	48	72	120

2. **I. Course Content**

Course Objective – The purpose of mastering the course *Engineering Psychology* is to form a system of knowledge in the field of labor psychology, engineering psychology, and ergonomics; to study and address scientific and practical problems related to increasing labor efficiency, maintaining health, and developing the personality of the labor subject.

Course Tasks – To provide students with theoretical knowledge of engineering psychology, illuminating the historical development of psychological ideas; to create a favorable environment for students to become well-rounded individuals and competent specialists, understanding the state policy principles, modern psychological approaches, and advanced technologies.

The role of modern information and pedagogical technologies in teaching the course:

To master the course *Engineering Psychology*, students must engage with advanced and innovative teaching methods, applying modern information and pedagogical technologies. In studying the course, textbooks, study guides, methodological instructions, and electronic lecture materials are used.

II. Main Theoretical Part (Lecture Sessions)

The course includes the following topics:

Module 1. Objects of Engineering Psychology

Topic 1. Basic Concepts, Subject, Objectives, and Core Conceptual Principles of Engineering Psychology

- Engineering psychology as a scientific and applied discipline.
- The history of the formation of engineering psychology, its subject, objectives, and tasks.
- The emergence and development of engineering psychology.
- Connections of engineering psychology with other disciplines;

understanding engineering psychology within the system of academic subjects, and as a specialized discipline.
- Concepts of engineering psychology and technical aesthetics.
- Human interaction with production technologies.
- Human-technology system.
- The “operator” as a labor subject in complex technical systems.

Topic 2. Theoretical and Methodological Foundations of Engineering Psychology

- General understanding of research methods in engineering psychology.
- Diagnostic methods.
- Empirical-cognitive methods.
- Methods for analyzing and interpreting empirical data.
- Survey method.
- Chronometric method.
- Test method.
- Modeling method and its types.
- Methods for studying labor activity, including participant observation.
- Objective recording of labor operations.

Topic 3. Occupations and Their Classification. The Essence of Professionography (Professionogram)

- Classification of occupations. Psychological classification of occupations.
- Psychological systematization of occupations.
- Differential-typological approach (E.A. Klimov’s concept; J. Holland’s concept of personal vocational preferences and occupational environment typology).
- Classification of occupations created for vocational guidance and counseling (E.A. Klimov).
- Key concepts in the psychological study of occupations: professionography, professionogram, specialist psychogram.
- Principles and tasks of professionography.

Topic 4. Human–Technology Interaction

- Human-technology interaction.
- Objects of the operator’s work in production processes.
- Tasks of the operator in labor activity.

- Psychological structure of operator activity.
- Information exchange in human-technology systems.
- Classification of types of operator work.
- Influence of machine properties on worker activity.

Topic 5. Professional Motivation

- Concepts of need, motive, incentive, motivation, professional interests, job satisfaction, and the motivational orientation of the labor subject and their significance.
- Professional motive and motivation.
- Classification of labor motives.
- Biogenetic and sociogenetic theories of personality.
- Personal activity.
- Stages of professional development of the individual.

Module 2. Manifestations of Psychological Functions in Engineering Personnel

Topic 6. Psychological Description of the Cognitive Activity of Engineering Personnel

- Types of attention and their characteristics.
- Development and features of attention in the individual.
- Analysis of requirements for engineers' attention and formation of scientific understanding.
- Concepts of perception in professional activity.
- Perception and vocational guidance, perception characteristics.
- Apperception.
- Perception of time, motion, and space.
- Requirements for engineers' perception.
- Constancy of perception.
- Understanding the laws of perception in vocational guidance.

Topic 7. Psychological Description of the Cognitive Activity of Engineering Staff

- (This section can continue with detailed study of memory, thinking, and cognitive processes in engineers, including professional problem-solving, reasoning, and individual differences in cognitive activity.)

Topic 7. Cognitive Activity and Memory in Engineering Personnel

- Work activity and memory.
- Personal experience and memory.
- Types and processes of memory.
- Conditions for memorization.
- Understanding and scientific insights into applying memory laws in professional counseling.
- Thinking and mastering a profession.
- Forms, types, and operations of thinking.
- Individual characteristics in thinking.
- The role of thinking in mastering the engineering profession.
- Flexibility of operator thinking and its assessment.
- Practical thinking in operator activity.

Topic 8. Individual-Typological Characteristics in Engineering Activity

- Temperament and professional choice.
- Characteristics and types of temperament.
- Individual style of engineering work and temperament.
- Understanding the role of temperament in acquiring professional skills.
- Character and professional qualities.
- Professional abilities and skills in engineering systems.
- Abilities, their natural foundations, and professional development of engineers.

Topic 9. Role of Emotional-Volitional and Personal Qualities in Enhancing Work Efficiency

- Emotional-volitional domain of the engineer and professional adaptation.
- Expression of emotional states.
- Types of emotions.
- Anxiety, fear, professional neuroses.
- Methods of psychological assistance after mental trauma.
- General characteristics of volitional activity.
- Volitional qualities of personality and their development.
- Volitional control of behavior.
- Psychology of professional adaptation.

Module 3. Engineering Personnel and Work Activity

Topic 10. Psychology of Work Organization

- Work organization and its role in labor activity.
- Division of labor and cooperation.
- Classification of workplaces.
- Organization, planning, and service of workstations.
- Work discipline and its encouragement.
- Significance of work conditions and standardization.
- General understanding of work schedules.
- Planning work and rest for employees.
- Psychohygiene.
- Occupational fatigue: causes, prevention, and the role of rest.
- Concept of professional fitness and its subjective factors.

Topic 11. Work Quality and Psychotechnological Issues

- Concept of work quality.
- Psychological factors in ensuring work quality.
- Ensuring occupational safety.
- Causes and types of accidents and methods of identification and prevention (analytical, statistical, experimental).
- Types of erroneous actions.
- Important professional traits and abilities in labor activity.
- Professional adaptation.
- Psychomotor characteristics.
- Sensomotor components of work activity.
- Psychological requirements for tools and equipment layout.
- Human activity, operator activity, and their objectives.
- Classification of operator activities.
- Groups: social-psychological issues in labor teams.
- Managing group work.
- Types of groups and labor activity issues within them.

Topic 12. Decision-Making in Engineering Activity

- Psychological aspects of decision-making.
- Decision-making at the perceptive level.
- Characteristics of decision-making at the speech-cognitive level.

III. Seminar Classes: Guidelines and Recommendations

The following topics are recommended for seminar classes:

1. Basic concepts, subject, purpose, and conceptual principles of engineering psychology.
2. Theoretical and methodological foundations of engineering psychology.
3. Occupations and their classification. Essence of professionography (professionogram).
4. Human–technology interaction.
5. Professional motivation.
6. Psychological description of the cognitive activity of engineering personnel.
7. Individual-typological characteristics in engineering activity.
8. Role of emotional-volitional and personal qualities in enhancing work efficiency.
9. Psychology of work organization.
10. Work quality and psychotechnological issues.
11. Sensomotor requirements in work activity and group activity in engineering.
12. Decision-making in engineering activity.

Recommendations for Seminar Classes

- Seminars should be conducted in classrooms equipped with multimedia devices or standard teaching equipment.
- Each seminar session should be conducted by one instructor per academic group.
- Active and interactive teaching methods should be used.
- Appropriate pedagogical and information technologies should be applied according to the topic.

IV. Guidelines and Recommendations for Laboratory Work

Laboratory work is **not included** in the curriculum.

V. Guidelines and Recommendations for Course Work

Course work is **not included** in the curriculum.

VI. Independent Learning and Self-Study

Recommended topics for independent learning:

1. Motivations of labor activity.
2. Personality psychology and its formation.
3. Motivations for choosing an engineering profession.
4. Operator work in modern complex automated “Human–Machine” systems.

	5. Professional adaptation, inability to adapt, re-adaptation, “professional adjustment,” and its contributing factors. 6. Types of incidents: accidents, disasters, and catastrophes. 7. Study and prevention of objective and subjective causes of accidents and emergencies. 8. Crises in the professional development of an individual. 9. Development of a human as a labor subject at different stages of life. 10. Criteria of personal maturity and their application in employee management practices. 11. Stages of labor subject development in professionalization. 12. Concept of the psychology of work organization. 13. Concept of work quality. 14. Decision-making in engineering activities. 15. Professional maturity of the individual. 16. Emotional-volitional sphere of personality and professional adaptation. 17. Abilities, speech, and profession. 18. Information and psychological safety at work. 19. Self-respect and professional self-awareness. 1. .
3.	**VII. Learning Outcomes / Professional Competencies** Upon mastering the course, the student: • Gains knowledge about the relevance and role of engineering psychology in modern conditions, its main concepts and terminology, structural components, their study objects, and theoretical foundations. • Understands the classification of research methods in engineering psychology, areas of method application, personality psychology and professional development, labor activity motives, motivations for choosing an engineering profession, cognitive activity, attention, and issues related to professional choice, and is able to apply this knowledge in practice. • Studies the psychology of work organization in production, its role in labor activity, and rules for organizing, planning, and servicing workplaces. • Acquires knowledge about occupational health and hygiene standards, labor regime management, the importance of working conditions and labor standardization, planning of work and rest for employees, and the harmful effects of professional fatigue and overfatigue on the human body, taking environmental factors into account. • Gains knowledge and skills regarding human interaction with production equipment and technology, including understanding how machine properties influence worker activity. • Understands work quality, psychological factors ensuring work quality, ways to achieve occupational safety, causes and types of accidents and

	methods for their prevention, professional traits and abilities important in labor activity, and the psychological aspects of decision-making.
4.	**VIII. Modern Foreign Information and Educational Technologies and Advanced Teaching Methods** • **Cluster Graphic Organizer** – This method is used to freely express ideas. For example, a student can create a cluster on a studied topic. The central keyword is written in the middle, with related terms branching out. These branches can further subdivide into additional branches. • **Cinquain Method** – Derived from the French word meaning "five lines," this is a non-rhyming poem that helps synthesize information into a unified whole. It allows the student to present information about the studied concept (event, phenomenon, or topic) in various ways and from different perspectives in their own words. • **BBB Table** – Applied in all lecture classes. The BBB method ("Know," "Want to know," "Learned") allows students to monitor their own understanding, while the teacher can assess the lesson. At the beginning of the class, the student writes what they know about the topic (B1) and what they want to know (B2) in a notebook. At the end of the lesson, they record what they have learned (B3). • **SWOT Analysis Method** – This organizer develops students' skills in systematic thinking, comparison, evaluation, analysis, and idea development. SWOT stands for Strengths, Weaknesses, Opportunities, and Threats. Students write the corresponding characteristics of an object under each letter. • **Brainstorming Method** – Used to generate and organize ideas to answer a question related to the lesson topic. Each student presents their own ideas. Steps: create a problematic situation, generate ideas or solutions, listen to presentations, compare and select solutions, draw conclusions. • **Problem-Based Learning Method** – Initially, a problematic video is shown. Small groups identify issues during the viewing. They then share

solutions, make corrections, and finally form a group conclusion on the problem.

- **Venn Diagram** – Used to compare objects, identify similarities and differences, and analyze them. Circles represent individual objects, intersections show common and related features. Students are required to describe unique (1–3), related (4–6), and general (7) aspects in writing.
- **"Communication" Method** – Small groups study separate topics and prepare various materials (videos, photos, diagrams, scientific evidence). Groups then share their findings with each other. The teacher guides the discussion and provides feedback at the end.
- **Webinar Method** – An interactive session conducted remotely using modern information and communication technologies (computers, monitors, multimedia, etc.), allowing participants from different locations to engage in learning.
- **"Fishbone" (Ishikawa) Method** – This organizer develops systematic, creative, and analytical thinking skills. The head of the fishbone represents the topic, the upper branches indicate problems, and the lower branches list supporting evidence.

These modern information and educational technologies have been widely implemented in the teaching processes of leading universities worldwide.

VII. Criteria for Monitoring and Assessing Students' Knowledge

Mastering the subject requires students to:

- Fully understand theoretical and methodological concepts of the discipline, accurately reflect analysis results, conduct independent reasoning about studied processes, complete tasks assigned during ongoing and interim assessments, and submit written work for the final assessment.

Current Assessment (Ongoing Control) – This is a method to determine and evaluate the student's level of knowledge and practical skills on the topics of the subject. Based on the characteristics of the discipline, current assessment is conducted through oral questioning, review of prepared seminar works, practical assignments, and discussions. If the tasks assigned for independent study are not fully completed, the student is not allowed to take the final assessment.

- Students who fully complete seminar tasks independently and can apply them in practice receive a grade of 5.
- Students who complete the tasks independently, but with some variation in volume and quality, receive a grade of 4.
- Students who do not fully complete the tasks receive a grade of 3, depending on the volume and quality of the completed work.

All seminar tasks must be completed both theoretically and practically. If the

seminar work is incomplete or conclusions are not formed, the student receives an unsatisfactory grade and is not allowed to take the final assessment.

Interim Assessment – This is a method to determine and evaluate the student's level of knowledge and practical skills after completing the relevant section of the curriculum (covering several topics of the subject) during the semester. Interim assessments are conducted twice per semester in written form, according to the total hours allocated for the subject.

- Students answer 3 questions in the written interim assessment. Each question is graded 5 points:
  - If the question's content is fully addressed and key facts are correctly stated – 5 points.
  - If the answer is correct but has minor shortcomings – 4 points.
  - If the answers are general with significant shortcomings – 3 points.
  - If the question is partially or not addressed at all, or the content is not fully revealed – 2 points.

Final Assessment – Students must answer 3 written questions. Each question is graded 5 points following the same criteria as the interim assessment:

- 5 points – complete and accurate answer.
- 4 points – mostly correct with minor shortcomings.
- 3 points – general answers with notable shortcomings.
- 2 points – incomplete or insufficiently explained answers.

Procedure for Conducting the Final Written Assessment
The written assessment method within a rating system develops students' ability to think independently and express their thoughts in writing. Final assessments for the subject are conducted in written form. Questions and variants for the written assessment are newly prepared at the beginning of each academic year by the department's professors and instructors, discussed at a departmental meeting, and approved. The content, scope, and significance of each question in every variant of the written work are checked and confirmed by the head of the department with their signature.

The written assessment is primarily scheduled for the last two academic weeks of each semester, following the established curriculum timeline.

Weekly Sessions and Written Work

The course sessions are conducted according to the weekly schedule of the subject.

Written work variants contain **3 questions with key phrases**. The assessment criteria for the written work are based on a 5-point scale used for final grading, with each question worth 5 points. After the written work is completed, professors

check and grade the submissions within **two days**, and the results are communicated to students.

The **volume of the written work** must be sufficient to evaluate the student's understanding, knowledge, and practical skills in the subject.

Recording of Rating Results

Scores accumulated through different types of assessments are recorded at the end of each semester by the professor in the **rating report** and the student's **rating booklet** as whole numbers.

Interim Assessment Questions

I – First Interim Assessment Questions:

1. Engineering psychology as a scientific and applied discipline.
2. History of the formation of engineering psychology, its subject, purpose, and tasks.
3. Emergence and development of engineering psychology.
4. Connections of engineering psychology with other disciplines.
5. Engineering psychology in the system of academic subjects.
6. Concepts of engineering psychology and technical aesthetics.
7. Human interaction with production equipment.
8. Human-technology systems.
9. The "operator" as a labor subject in complex technical systems.
10. General understanding of research methods in engineering psychology.
11. Diagnostic methods (empirical-cognitive methods, methods of analyzing and interpreting empirical data).
12. Survey (questionnaire) method.
13. Chronometric method.
14. Test method.
15. Modeling method and its types.
16. Methods for studying labor activity, including participant observation.
17. Objective recording of labor operations.
18. Occupations and their classification.
19. Psychological classification of occupations.
20. Psychological systematization of occupations.
21. Differential-typological approach (E.A. Klimov's concept; J. Holland's concept of personal vocational preferences and occupational environment typology).
22. Key concepts in the psychological study of occupations: professionography,

professionogram, specialist psychogram. Principles and tasks of professionography.

23. Human-technology collaboration. Objects of the operator's work in production processes.
24. Tasks of the operator in labor activity.
25. Psychological structure of operator activity.
26. Information exchange in human-technology systems.
27. Influence of machine properties on worker activity.
28. Concepts of labor subject's motivational orientation and their significance.
29. Professional motive and motivation; classification of labor motives.
30. Biogenetic and sociogenetic theories of personality.
31. Personal activity.
32. Stages of professional development of the individual.
33. Types of attention and their characteristics; development and features of personal attention.
34. Requirements for engineers' attention and formation of scientific understanding.
35. Concepts of perception in professional activity; perception and vocational guidance.
36. Requirements for engineers' perception; constancy of perception.
37. Understanding the laws of perception in vocational guidance and forming scientific insight.

II – Second Interim Assessment Questions:

- Work activity and memory.
- Personal experience and memory.
- Types and processes of memory; conditions for memorization.
- Applying memory laws in professional counseling.
- Thinking and mastering a profession.
- Forms, types, and operations of thinking.
- Individual characteristics in thinking.
- Role of thinking in mastering the engineering profession.
- Flexibility of operator thinking; its assessment; practical thinking in operator activity.
- Temperament and professional choice.
- Characteristics and types of temperament.
- Individual style of engineering work and temperament.
- Character and professional qualities.
- Professional abilities and skills in engineering systems.
- Abilities, their natural foundations, and professional development of engineers.

	• Role of emotional-volitional and personal qualities in enhancing engineering work efficiency. • Emotional-volitional domain of the engineer and professional adaptation; expression of emotional states. • Work organization and its role in labor activity. • Division of labor and cooperation. • Classification of workplaces. • Organization, planning, and provision of workplaces. • Work discipline and its motivation. • Significance of working conditions and labor standardization. • General concept of work schedule. • Planning employees' work and rest time. • Psychohygiene. Occupational fatigue; causes of fatigue and overfatigue; role of rest in preventing overfatigue and the psychology of organizing rest. • Content of professional fitness. • Concept of work quality. • Psychological factors in ensuring work quality. • Ways to achieve occupational safety. • Causes and types of accidents; methods of identification and prevention (analytical, statistical, experimental). • Types of erroneous actions. • Important professional traits and abilities in labor activity. • Professional adaptation. • Sensomotor components of labor activity. • Psychological requirements for tools and equipment layout. • Human activity, operator activity, and their objectives. • Classification of operator activities. • Concept of group. • Social-psychological issues in groups and labor teams. • Managing group work. • Types of groups and labor activity issues within them. • Decision-making in engineering activity. • Psychological aspects of decision-making. .
5.	**Requirements for obtaining loans:** To fully master theoretical and methodological concepts related to science, to be able to correctly reflect the results of the analysis, to independently observe about the processes being studied and the task given in the forms of current, intermediate control and completing assignments, submitting a written work on final control.

IX. Main and Additional Educational Literature and Information Sources

Main Literature:

1. Yulchiyeva Z.N., Ruzmetova S.T. *Engineering Psychology*. Study Guide. “Innovatsion rivojlanish” Publishing House – Tashkent, 2023. – 252 pages.
2. Z. Kurbanova, D. Oribboyeva. *Labor and Engineering Psychology*. Study Guide: “O’zkitobsavdo” Publishing, 2023. – 212 pages.
3. Yusupova F.Z. *Professional Psychology: Textbook*. Navoi: SCIENCE ALGORITHM, 2023. – 372 pages.
4. Ronald E. Riggio, Stefanie K. Johnson: *Introduction to Industrial/Organizational Psychology*. New York, 2022.
5. Yulchiyeva Z.N. *Occupational Psychology: Textbook*. Tashkent: Nodirabegim, 2021. – 360 pages.

Additional Literature:

1. Mirziyoyev Sh.M. *From National Revival to National Rise* (4 volumes) – Tashkent: “O‘zbekiston” Publishing, 2020. – 488 pages.
2. Mirziyoyev Sh.M. *New Uzbekistan Development Strategy*, Revised Second Edition – Tashkent: “O‘zbekiston” Publishing, 2022. – 416 pages.
3. Mirziyoyev Sh.M. *Rule of Law and Ensuring Human Interests – The Guarantee of National Development and Public Welfare*. Speech dedicated to the 24th anniversary of the Constitution of the Republic of Uzbekistan, December 7, 2016 – Tashkent: “O‘zbekiston” NMIU, 2016. – 48 pages.
4. Mirziyoyev Sh.M. *Critical Analysis, Strict Discipline, and Personal Responsibility – Should Be the Daily Rule of Every Leader*. Tashkent, Uzbekistan, 2017. – 104 pages.
5. Sergeev V.S. *Engineering Psychology and Ergonomics: Textbook*. Moscow: Research Institute of School Technologies, 2008. – 176 pages.
6. Strelkov Yu.K. *Engineering and Professional Psychology: Textbook for Higher Education Students*, 2nd edition. Moscow: “Academy”, 2005. – 360 pages.
7. Sergeev S.F. *Introduction to Engineering Psychology and Ergonomics of Immersive Environments: Textbook*. Saint Petersburg: SPbGU ITMO Publishing, 2011. – 258 pages.
8. Qodirov K.B. *Psychological Aspects of Career Choice and Professional Diagnosis*. Tashkent, 2001.

Information Sources:

1. www.tdpu.uz
2. www.pedagog.uz
3. www.edu.uz
4. www.ziyonet.uz

	5. tdpu-INTRANET.Ped 1.
7.	The course curriculum has been refined based on the educational programs of Lomonosov Moscow State University, which is ranked among the top 300 universities worldwide (QS World University Rankings – 94) (Moscow). The course curriculum has been approved by the Council of Navoiy State University of Mining and Technology by protocol № ___ dated 2025.
8.	**Person(s) responsible for the course/module:** Shamiyeva O.R. – Associate Professor, Department of "Social-Humanitarian Sciences and Physical Education," PhD in Psychology.
9.	**Reviewers:** • R. Begmatov – Associate Professor, Department of "Pedagogy and Psychology," NDU, PhD in Psychology. • S.J. Bozorova – Head of the Education Quality Control Department, NDKTU, Doctor of Pedagogical Sciences, Professor.

REPUBLIC OF UZBEKISTAN
MINISTRY OF MINING INDUSTRY AND GEOLOGY
NAVOI STATE UNIVERSITY OF MINING AND TECHNOLOGIES

Faculty of Chemistry and Metallurgy
Department of Social-Humanitarian Sciences and Physical Education

"APPROVED"
Dean of the Faculty: S.Sh. Sharipov
____ _____
"____" _____ 2025

ENGINEERING PSYCHOLOGY

Course **Syllabus**

Field(s) of Study / Specializations:

- 60720800 – Mining Engineering
- 60710400 – Power Engineering
- 60720400 – Technological Machines and Equipment
- 61020200 – Occupational Safety and Industrial Safety

Navoi **– 2025**

Module / Course Syllabus

Name of science:	Engineering psychology Selection
Fan type:	Selection
Fan Code:	MP3504 or MP3604
Year:	2025-2026
Semester:	3,4
Form of Education:	Diurnal
The form of classes and the hours allocated for the semester:	120
Lecture	24
Practical training	
Laboratory training	–
Seminar	24
Independent Education	72
Loan amount:	4

Assessment form:	Exam
Fan language:	Uzbek

Science goal (FM)	
FM1	The purpose of the science is to formulate a system of knowledge in the field of approaches and theoretical concepts of Labor psychology, engineering psychology and ergonomics; methods of research and solution of scientific and practical problems of improving labor efficiency, maintaining health and developing the personality of the subject of Labor. The tasks of teaching science are the theory of engineering psychology in students, the formation of theoretical knowledge that illuminates the essence of the historical progress of psychological thoughts; the content of state policy on the upbringing of a complete person, a mature specialist, priority principles, modern psychological approaches, the creation of a favorable environment for students to be aware of advanced technologies.

Basic knowledge required to master the subject	
1.	General psychology
2.	Labor psychology
3.	Professional psychology
4.	Psychophysiology
5.	Social psychology
6.	Psychodiagnosticsage periods
7.	Pedagogicalods
8.	Pedagogical psychology

Learning Outcomes (LO) / Professional Competencies	
	In terms of knowledge:
TN1	Upon completion of the course, the student will be able to: • Understand the **subject, purpose, and objectives of engineering psychology**, its practical foundations, its role within the system of related disciplines, and the concept of engineering psychology as a professional field, demonstrating a clear scientific understanding. • Know and apply the **research methods of engineering psychology**, including their classification and areas of application; understand **personal psychology and professional development**, labor activity motivations, motives for choosing the engineering profession, cognitive activity of a person, attention, and career

	selection issues, and be able to use this knowledge effectively. • Demonstrate knowledge and skills in **emotional-volitional aspects of personality and professional adaptation**, temperament and professional mastery, self-assessment, professional self-awareness, and **decision-making skills in engineering activities**.
TN2	**Study human information processing processes and mechanisms** and, based on this knowledge, apply principles to **optimize human–machine interaction** in complex automated systems. Develop methods to **describe and quantitatively assess human activity** within automated control environments. **Master the fundamental principles of designing technical devices** integrated with human capabilities to enhance efficiency and safety. **Understand and apply principles for organizing and managing technological processes**, ensuring smooth operation and coordination. **Learn methods for selecting personnel** possessing key professional qualities necessary to operate complex technical equipment effectively. **Acquire knowledge of professional training methods** for personnel using complex technical systems, ensuring skill development and operational competence. **Understand the individual psychological characteristics of workers** operating various tools and equipment under low-temperature or challenging environmental conditions. **Develop the ability to continuously update professional knowledge**, quickly adapt to fast technological changes in the global market, acquire new types of skills efficiently, and perform diverse professional functions competently.
TN3	**What a future specialist should know and master:** • **The subject and objectives of engineering psychology** – what the discipline studies, its main goals, and tasks. • **The main categories and concepts of engineering psychology** – a deep understanding of fundamental terms and their meanings within engineering psychology. • Understanding the specific characteristics of operator activity in the **"human-machine" system**; • Knowledge of the design of **information display devices** and **control elements**; • Understanding the **principles of designing human-machine**

	systems. **Abilities:** • Organize the **operator's workplace** effectively; • Acquire skills to **work in a team**. **Skills:** • Master the **professionally important personal qualities of an operator**, such as: interest in the work, ability to remain composed in stressful situations, emotional stability, breadth of attention, switching speed, and attention stability, among others; • Make **decisions during professional activity**; • Understand the **reliability of the operator** and the features of the human-machine system.
TN4	The **"Engineering Psychology"** course is related to the student's chosen field of study. To fully master this course, students should have knowledge of the following subjects: • **General Psychology** • **Developmental (Age) Psychology** • **Occupational Psychology** • **Professional Psychology** • **Social Psychology** • **Psychodiagnostics and Educational Psychology**
	In terms of skills:
TN5	The acquisition of methods of selection and use of information in Internet social networks; the ability to make independent decisions in his professional activities, have competitive universal training in the appropriate direction of The Bachelor's degree;
TN6	The relationship of students to technology in their work, the role of the human factor in these relationships, the study of psychological states, characteristics, and processes in the human-technology system;
TN7	Ability to predict social processes, ensure physical and mental health, and mental safety, and adhere to a healthy lifestyle;
TN8	They should have the skills and abilities to use the power of critical thinking to promote social stability, increase social control, and increase personal responsibility.

Science content		
Main theoretical part (lecture sessions) The subject matter includes the following topics: Form of classes: lecture (M)		**Clock**
M1	Module 1. Objects of engineering psychology. Basic concepts, subject, purpose and basic conceptual rules of engineering psychology.	2
M2	Theoretical and methodological foundations of engineering psychology.	2
M3	Professions and their classification. The essence of professiography (professiogram).	2
M4	Human and technical cooperation.	2
M5	Professional motivation.	2
M6	Module 2. Forms of manifestation of the psyche in engineering personnel. Psychological description of the cognitive activity of the personality of engineering personnel.	2
M7	Psychological description of the cognitive activity of an engineer.	2
M8	Individual-typological characteristics in engineering activities.	2
M9	The role of emotional, volitional, and personal qualities in improving the performance of engineering personnel.	2
M10	Module 3. Engineering personnel and labor activity. Psychology of labor organization.	2
M11	Psychotechnological issues of labor quality and its organization. Sensomotor requirements in labor activity. Group engineering activities.	2
M12	Decision-making in engineering activities.	2
Training format: workshop (S)		
S1	Module 1. Objects of engineering psychology. Basic concepts, subject, purpose and basic conceptual rules of engineering psychology.	2
S2	Theoretical and methodological foundations of engineering psychology.	2
S3	Professions and their classification. The essence of professiography (professiogram).	2
S4	Human and technical cooperation.	2
S5	Professional motivation.	2
S6	Module 2. Forms of manifestation of the psyche in engineering personnel. Psychological description of the cognitive activity of the personality of engineering personnel.	2
S7	Psychological description of the cognitive activity of an engineer.	2
S8	Individual-typological characteristics in engineering activities.	2
S9	The role of emotional, volitional, and personal qualities in improving the performance of engineering personnel.	2
S10	Module 3. Engineering personnel and labor activity. Psychology of labor organization.	2

S 11	Psychotechnological issues of labor quality and its organization. Sensomotor requirements in labor activity. Group engineering activities.	2
S 12	Decision-making in engineering activities.	2
Form of class: Laboratory session (L)		
L1	In this subject, laboratory sessions are not envisaged.	

Science content

Type of training: lecture (M)	
M 1	**Module 1: Objects of Engineering Psychology** **Topic 1: Basic Concepts, Subject, Objectives, and Key Conceptual Principles of Engineering Psychology** **Outline:** • **Engineering psychology as a scientific and applied discipline**: o History of the formation of engineering psychology o Subject, objectives, and tasks of engineering psychology o Emergence and development of engineering psychology • **Interrelation with other disciplines**: o Engineering psychology in the system of academic subjects o Engineering psychology as a specialty discipline o Formation of understanding and scientific concepts about engineering psychology • **Concepts of engineering psychology and technical aesthetics**: o Human interaction with production equipment o Human-technical system o The "operator" as a labor subject in complex technical systems
M2	**Topic 2: Theoretical and Methodological Foundations of Engineering Psychology** **Outline:** • **General understanding of research methods in engineering psychology** • **Diagnostic methods:** o Empirical-cognitive methods o Methods for analyzing and interpreting empirical data o Questionnaire (survey) method o Chronometric method o Testing method o Modeling method and its types • **Methods for studying labor activity:**

	○ Participant observation method ○ Objective recording of labor operations
M3	**Topic 3: Occupations and Their Classification. The Essence of Professionography (Professionogram)** • **Outline:** • **Occupations and their classification:** ○ Classification of occupations ○ Psychological classification of occupations • **Psychological systematization of occupations:** ○ Differential-typological approach (E.A. Klimov's concept; J. Holland's concept of personal professional preferences and typology of professional environments) ○ Classification of occupations created for career guidance and vocational counseling (E.A. Klimov) • **Key concepts in the psychological study of occupations:** ○ Professionography ○ Professionogram ○ Specialist psychogram ○ Principles and tasks of professionography
M4	**Topic 4: Human–Technology Interaction** **Outline:** • **Human–technology interaction** – principles and key aspects. • **Objects of operator work in the production process:** ○ Operator's tasks in labor activity ○ Psychological structure of operator activity • **Information exchange in human–technology systems** – mechanisms and features. • **Influence of machine properties on worker performance** – how technical characteristics affect operator efficiency and behavior.
M5	**Topic 5: Professional Motivation** **Outline:** • **Professional motive and motivation:** ○ Classification of work motives ○ Motives for labor activity

	○ Motives for choosing a profession ○ Motives for choosing the engineering profession ○ Issues of motivation management • **Formation of professional motives:** Developing an understanding and scientific insight into how professional motives are shaped. • **Biogenetic and sociogenetic theories of personality:** ○ Personal activity and engagement ○ Understanding the stages of professional development of an individual
M6	**Module 2: Manifestations of Psychology in Engineering Personnel** **Topic 6: Psychological Description of Cognitive Activity in Engineering Personnel** **Outline:** • **Types of attention and their characteristics:** ○ Development and characteristics of personal attention ○ Understanding the requirements for attention in engineers and forming a scientific perspective on this analysis • **Perception in professional activity:** ○ Concepts of perception and professional orientation ○ Characteristics of perception in professional tasks • **Apperception:** ○ Perception of time, movement, and space ○ Requirements for perception in engineers ○ Constancy of perception • **Considering the laws of perception in professional guidance:** ○ Forming an understanding and scientific insight into applying perception laws when guiding professionals
M7	**Topic 7: Psychological Description of Cognitive Activity in Engineering Personnel** **Outline:** • **Work activity and memory:** ○ Personal experience and memory of an individual ○ Types and processes of memory ○ Conditions for effective retention • **Accounting for memory laws in professional counseling:** ○ Applying principles of memory in guiding professional development

	• **Thinking and mastering a profession:**
	  o Forms, types, and operations of thinking
	• **Individual characteristics of thinking:**
	  o Role of thinking in mastering the engineering profession
	  o Flexibility of operator thinking and methods of its assessment
	  o Practical thinking in operator work

M8	**Topic 8: Individual-Typological Characteristics in Engineering Activity**
	
	Outline:
	
	• **Temperament and professional mastery:**
	  o Issues of temperament in professional development
	  o Characteristics and types of temperament
	  o Individual style of an engineer's professional activity and its connection to temperament
	  o Understanding the relationship between temperament and acquisition of professional skills
	• **Character and professional qualities:**
	  o The role of character in shaping professional traits and behavior
	• **Professional abilities and skills in engineering systems:**
	
	  o Key professional abilities and skills
	  o Their natural foundations
	  o The formation of an engineer's professional competence

M9	**Topic 9: The Role of Emotional-Volitional and Personal Traits in Enhancing the Efficiency of Engineering Staff**
	
	Outline:
	
	• **Emotional-volitional sphere and professional adaptation:**
	  o Emotional-volitional characteristics of the engineer
	  o Adaptation to professional activity
	• **Expression of emotional states:**
	  o Types of emotions
	  o Anxiety, fear, professional neuroses
	  o Methods of providing psychological assistance to staff after mental trauma
	• **Volitional activity:**
	  o General characteristics of volitional activity
	  o Volitional qualities of the individual and their development
	  o Volitional regulation of behavior

	○ Understanding the psychology of professional adaptation and forming scientific concepts about it
M10	**Module 3: Engineering Staff and Work Activity** **Topic 10: Psychology of Work Organization** **Outline:** • **Organization of work and its role in labor activity:** ○ Work organization and its significance in labor activity ○ Division of labor and cooperation • **Classification and arrangement of workplaces:** ○ Workplace classification ○ Organization, planning, and servicing of workplaces ○ Labor discipline and its motivation ○ Importance of working conditions and labor standardization • **Work schedule and psychophysiology:** ○ General understanding of the work schedule ○ Planning employees' work and rest periods ○ Psychohygiene ○ Professional fatigue • **Fatigue and overfatigue:** ○ Causes of fatigue and overfatigue ○ Role of rest in preventing overfatigue and the psychology of rest organization ○ Concept of work capacity ○ Subjective factors of professional fitness.
M11	**Topic 11: Work Quality and Psychotechnological Aspects of Its Organization. Sensorimotor Requirements in Work Activity. Group Activity in Engineering.** **Outline:** • **Work quality:** ○ Concept of work quality ○ Psychological factors ensuring work quality • **Occupational safety and error prevention:** ○ Ways to achieve labor safety ○ Causes and types of accidents ○ Methods to identify and eliminate accidents (analytical, statistical, experimental) ○ Types of incorrect actions ○ Concept of professional fitness

	○ Professionally important qualities and abilities in work activity ○ Professional adaptation • **Psychomotor characteristics:** ○ Sensorimotor components of labor activity ○ Forms of tools and equipment and psychological requirements for their arrangement • **Human and operator activity:** ○ Purpose of human and operator activity ○ System or subsystem concept ○ Classification of operator activity • **Group activity in engineering:** ○ Concept of a group ○ Social-psychological issues of work teams ○ Management of group activity ○ Types of groups and labor activity issues within them
M12	**Topic 12: Decision-Making in Engineering Activity** **Outline:** • **Psychological aspects of decision-making** • **Decision-making at the perceptual level** • **Features of decision-making at the speech-cognitive level**
Training format: seminar (S)	
S1	**Module 1: Objects of Engineering Psychology** **Topic 1: Basic Concepts, Subject, Objectives, and Key Conceptual Principles of Engineering Psychology** **Outline:** • **Engineering psychology as a scientific and applied discipline**: ○ History of the formation of engineering psychology ○ Subject, objectives, and tasks of engineering psychology ○ Emergence and development of engineering psychology • **Interrelation with other disciplines**: ○ Engineering psychology in the system of academic subjects ○ Engineering psychology as a specialty discipline ○ Formation of understanding and scientific concepts about engineering psychology • **Concepts of engineering psychology and technical aesthetics**: ○ Human interaction with production equipment ○ Human-technical system ○ The “operator” as a labor subject in complex technical

	systems

S2	**Topic 2: Theoretical and Methodological Foundations of Engineering Psychology**
	
	Outline:
	
	• **General understanding of research methods in engineering psychology**
	• **Diagnostic methods:**
	  o Empirical-cognitive methods
	  o Methods for analyzing and interpreting empirical data
	  o Questionnaire (survey) method
	  o Chronometric method
	  o Testing method
	  o Modeling method and its types
	• **Methods for studying labor activity:**
	  o Participant observation method
	  o Objective recording of labor operations

S3	**Topic 3: Occupations and Their Classification. The Essence of Professionography (Professionogram)**
	
	• **Outline:**
	• **Occupations and their classification:**
	  o Classification of occupations
	  o Psychological classification of occupations
	• **Psychological systematization of occupations:**
	  o Differential-typological approach (E.A. Klimov's concept; J. Holland's concept of personal professional preferences and typology of professional environments)
	  o Classification of occupations created for career guidance and vocational counseling (E.A. Klimov)
	• **Key concepts in the psychological study of occupations:**
	  o Professionography
	  o Professionogram
	  o Specialist psychogram
	  o Principles and tasks of professionography

S4	**Topic 4: Human–Technology Interaction** **Outline:**

	• **Human–technology interaction** – principles and key aspects.
	• **Objects of operator work in the production process:**
	  o Operator's tasks in labor activity
	  o Psychological structure of operator activity
	• **Information exchange in human–technology systems** – mechanisms and features.
	• **Influence of machine properties on worker performance** – how technical characteristics affect operator efficiency and behavior.

S5	**Topic 5: Professional Motivation**
	
	Outline:
	
	• **Professional motive and motivation:**
	  o Classification of work motives
	  o Motives for labor activity
	  o Motives for choosing a profession
	  o Motives for choosing the engineering profession
	  o Issues of motivation management
	• **Formation of professional motives:** Developing an understanding and scientific insight into how professional motives are shaped.
	• **Biogenetic and sociogenetic theories of personality:**
	  o Personal activity and engagement
	  o Understanding the stages of professional development of an individual

S6	**Module 2: Manifestations of Psychology in Engineering Personnel**
	
	Topic 6: Psychological Description of Cognitive Activity in Engineering Personnel
	
	Outline:
	
	• **Types of attention and their characteristics:**
	  o Development and characteristics of personal attention
	  o Understanding the requirements for attention in engineers and forming a scientific perspective on this analysis
	• **Perception in professional activity:**
	  o Concepts of perception and professional orientation
	  o Characteristics of perception in professional tasks
	• **Apperception:**
	  o Perception of time, movement, and space

	○ Requirements for perception in engineers ○ Constancy of perception • **Considering the laws of perception in professional guidance:** ○ Forming an understanding and scientific insight into applying perception laws when guiding professionals
S7	**Topic 7: Psychological Description of Cognitive Activity in Engineering Personnel** **Outline:** • **Work activity and memory:** ○ Personal experience and memory of an individual ○ Types and processes of memory ○ Conditions for effective retention • **Accounting for memory laws in professional counseling:** ○ Applying principles of memory in guiding professional development • **Thinking and mastering a profession:** ○ Forms, types, and operations of thinking • **Individual characteristics of thinking:** ○ Role of thinking in mastering the engineering profession ○ Flexibility of operator thinking and methods of its assessment ○ Practical thinking in operator work
S8	**Topic 8: Individual-Typological Characteristics in Engineering Activity** **Outline:** • **Temperament and professional mastery:** ○ Issues of temperament in professional development ○ Characteristics and types of temperament ○ Individual style of an engineer's professional activity and its connection to temperament ○ Understanding the relationship between temperament and acquisition of professional skills • **Character and professional qualities:** ○ The role of character in shaping professional traits and behavior • **Professional abilities and skills in engineering systems:** ○ Key professional abilities and skills ○ Their natural foundations

	○ The formation of an engineer's professional competence
S9	**Topic 9: The Role of Emotional-Volitional and Personal Traits in Enhancing the Efficiency of Engineering Staff** **Outline:** • **Emotional-volitional sphere and professional adaptation:** ○ Emotional-volitional characteristics of the engineer ○ Adaptation to professional activity • **Expression of emotional states:** ○ Types of emotions ○ Anxiety, fear, professional neuroses ○ Methods of providing psychological assistance to staff after mental trauma • **Volitional activity:** ○ General characteristics of volitional activity ○ Volitional qualities of the individual and their development ○ Volitional regulation of behavior ○ Understanding the psychology of professional adaptation and forming scientific concepts about it
S10	**Module 3: Engineering Staff and Work Activity** **Topic 10: Psychology of Work Organization** **Outline:** • **Organization of work and its role in labor activity:** ○ Work organization and its significance in labor activity ○ Division of labor and cooperation • **Classification and arrangement of workplaces:** ○ Workplace classification ○ Organization, planning, and servicing of workplaces ○ Labor discipline and its motivation ○ Importance of working conditions and labor standardization • **Work schedule and psychophysiology:** ○ General understanding of the work schedule ○ Planning employees' work and rest periods ○ Psychohygiene ○ Professional fatigue • **Fatigue and overfatigue:** ○ Causes of fatigue and overfatigue ○ Role of rest in preventing overfatigue and the psychology of rest organization

	○ Concept of work capacity ○ Subjective factors of professional fitness.
S11	**Topic 11: Work Quality and Psychotechnological Aspects of Its Organization. Sensorimotor Requirements in Work Activity. Group Activity in Engineering.** **Outline:** • **Work quality:** ○ Concept of work quality ○ Psychological factors ensuring work quality • **Occupational safety and error prevention:** ○ Ways to achieve labor safety ○ Causes and types of accidents ○ Methods to identify and eliminate accidents (analytical, statistical, experimental) ○ Types of incorrect actions ○ Concept of professional fitness ○ Professionally important qualities and abilities in work activity ○ Professional adaptation • **Psychomotor characteristics:** ○ Sensorimotor components of labor activity ○ Forms of tools and equipment and psychological requirements for their arrangement • **Human and operator activity:** ○ Purpose of human and operator activity ○ System or subsystem concept ○ Classification of operator activity • **Group activity in engineering:** ○ Concept of a group ○ Social-psychological issues of work teams ○ Management of group activity ○ Types of groups and labor activity issues within them
S 12	**Topic 12: Decision-Making in Engineering Activity** **Outline:** • **Psychological aspects of decision-making** • **Decision-making at the perceptual level** • **Features of decision-making at the speech-cognitive level**

1. Independent study

1. Purpose and Content of Independent Study

Independent work is an integral part of the educational process in the curriculum of the “Engineering Psychology” program.

Completing independent work complements the theoretical knowledge gained during classroom sessions, allowing students to develop learning skills, foster creative thinking, and pursue scientific inquiry.

Independent work involves analyzing literature on the studied topics and expressing the student’s personal perspective.

The main tasks of completing independent work are:

- Collecting practical information on the topic and developing skills for independent work with methodological materials and literature;
- Conducting research and analysis in the studied field, mastering research methodologies;
- Formulating scientifically grounded conclusions and recommendations based on the analysis of information.

2. Organization of Independent Study

Choosing the topic of independent work:

To select a topic, students should complete the following tasks:

- Identify problematic questions that arise during the study of the “Engineering Psychology” course;
- Review specialized articles and literature materials published in the field of “Engineering Psychology.”

3. Developing a Work Plan and Monitoring Its Implementation

Independent study supervisors work together with students to develop the assignment and a schedule for its completion.

The main stage of the work is the creation of an extended **work plan** by the student based on the assignment. The main deadlines for completing the plan are agreed upon. The work plan may be adjusted during the analysis of the problem based on the literature and materials on the topic.

4. Responsibilities in Preparing Independent Study

Main responsibilities of the instructor:

- Assist students in selecting topics for independent work;
- Approve the chosen topic and monitor its execution;
- Approve the schedule for preparing independent work and control its implementation;
- Monitor the quality of independent work.

5. Responsibilities of the Academic Supervisor

- Develop assignments for students to carry out independent work;
- Provide necessary assistance in preparing the work plan and selecting literature;
- Conduct consultations according to the approved schedule, advising on gathering materials, analyzing, summarizing, and applying them;
- Hold regular meetings and discussions with students during the process of preparing independent work according to the approved schedule;
- Monitor the adherence to the schedule and the quality of independent work;
- Provide organizational and methodological support during the preparation of independent work.

6. Responsibilities of Students

- Agree on the topic of the independent work;
- Follow the agreed schedule for completing the independent work and adhere to the specified deadlines;
- Submit the independent work within the designated timeframe.

Procedure and Tasks for Completing Independent Work

The student's independent work is an integral part of mastering the **"Engineering Psychology"** course. It is supported with methodological and informational resources and monitored according to the assessment system requirements.

At the end of the semester, the grade obtained for independent work is recorded along with the grade for in-class assignments in the group grade register, the student's rating book, and in the diploma supplement provided to the graduate.

The main purpose of independent work is to develop and enhance the student's knowledge and skills required to complete certain academic tasks independently under the guidance and supervision of the instructor.

Tasks of independent work:

- Acquire new knowledge independently and thoroughly;
- Identify effective methods and tools for finding necessary information;
- Use information sources efficiently;
- Work with traditional academic and scientific literature, regulatory documents;
- Work with electronic learning materials and databases;
- Use the Internet purposefully;
- Determine rational solutions to assigned tasks;
- Analyze data;
- Prepare results for expert review and refine them based on expert feedback;
- Approach tasks systematically and creatively.

Forms of independent work organization in "Engineering Psychology" include:

- Independently studying selected theoretical topics using academic and scientific literature;
- Preparing information reports (essays) on a given topic;
- Preparing for seminars and practical classes;
- Applying theoretical knowledge in practice and solving practical problems (case studies);
- Preparing scientific articles or abstracts for conferences.

Depending on the characteristics of the **"Engineering Psychology"** course, other forms of independent work may also be used.

Assignments for independent work are prepared by the department professor (or leading associate professor) together with the instructor directly conducting the lessons and approved by the head of the department. The assignment includes initial instructions and recommendations for completing the work.

Sources of information for independent work: textbooks and study guides, methodological manuals and instructions, data collections and databases, scientific and mass media publications, relevant Internet resources, and previously completed works on the topic.

Independent work is assessed with rating points corresponding to the hours allocated in the course syllabus, and the result is included in the student's overall course rating.

Student ratings, including those for independent work, are recorded in the traditional group rating register and in the faculty's electronic system. The types of control and evaluation criteria for independent work are determined by the department and approved by the Faculty Academic Council. The criteria for

assessment are provided to students along with methodological materials at the start of the academic year.

Students who score less than 3 points for independent work cannot participate in the final assessment of the course.

The progress of students' independent work in **"Engineering Psychology"** is regularly reviewed in student groups and department meetings. The student's independent work is retained by the department throughout the academic year.

Forms and Content of Independent Work

Each student, when preparing independent work, is recommended to use the following forms, taking into account the specifics of the course:

- Study chapters and topics of the course using textbooks and study guides;
- Review lecture materials provided as handouts;
- Work on sections or topics of the course using specialized literature;
- Deeply study sections and topics of the course related to the student's academic-research work;
- Participate in active and problem-based learning sessions;
- Distance (remote) learning.

Assessment Criteria for Independent Work

Independent work is assessed on a 5-point scale, where the maximum score is **5**.

The grade for independent work is based on the student's completed written assignment on the selected topic.

The assessment follows these sample criteria:

5 – Excellent (A):

- Ability to draw conclusions and make decisions;
- Ability to think creatively;
- Ability to conduct independent reasoning;
- Ability to apply acquired knowledge in practice;
- Understanding the essence of the topic;
- Knowledgeable, able to explain, and conceptual understanding.

4 – Good (B):

- Ability to conduct independent reasoning;
- Ability to apply acquired knowledge in practice;

- Understanding the essence of the topic;
- Knowledgeable, able to explain, and conceptual understanding.

3 – Satisfactory (C):

- Understanding the essence of the topic;
- Knowledgeable, able to explain, and conceptual understanding.

2 – Unsatisfactory (F):

- Failure to master the course;
- Lack of understanding of the essence of the subject;
- No clear conceptual understanding;
- Inability to think independently;
- Inability to summarize the topic.

Recommended topics for independent work (according to the sample program):		M / Sh form	Separated (in hours)
№1	**Preparing a Report on One of the Topics:** 1. Motivations of labor activity. 2. Personality psychology and professional development. 3. Motivations for choosing the engineering profession. 4. Operator work in modern complex automated "Human–Machine" systems. 5. Professional adaptation, inability to adapt, re-adaptation, "professional adjustment," and its contributing factors. 6. Types of incidents: accidents, disasters, catastrophes. 7. Studying and preventing the objective and subjective causes of accidents and emergencies. 8. Crises in professional development of a person. 9. Development of a person as a labor subject in various periods of life..		20
№2	**Preparing a Presentation on One of the Topics:** 1. Criteria for personal maturity and their use in employee management practice. 2. Stages of development of a labor subject in professionalization.		16

	3. Concept of labor organization psychology. 4. Concept of work quality. 5. Decision-making in engineering activities. 6. Professional maturity of a person.		
№3	The emotional-volitional sphere of a person and professional adaptation.	Analysis of scientific literature, preparation of an essay.	8
№4	Abilities, speech and profession.	Study the topic and create 5 tests related to the topic.	8
№5	Study the topic and create 5 tests related to the topic.	Working with text and analyzing text using the "SWOT analysis" method.	10
№6	Self-esteem and professional self-awareness.	Create 5 glossaries related to the topic.	10
Total			**72**

VIII. Foreign modern information and educational technologies and advanced teaching methods:	
	• "Cluster" Graphic Organizer This method is used to express ideas freely. For example, a student may create a cluster based on the topic studied. A key word is written in the center, and related terms are written in branches around it. These terms may also be further divided into sub-branches. **• Cinquain Method** This term comes from French and means "five lines." A cinquain is an unrhymed poem that helps to synthesize information into a whole. It expresses information about the studied concept (phenomenon, event, topic) in various forms and from different perspectives using the learner's own words. **• KWL (Know–Want to Know–Learned) Chart** This method is used in all lecture classes. Through the KWL method ("Know," "Want to Know," "Learned"), the student can monitor their own learning, while the teacher can evaluate the lesson. At the beginning of the lesson, the student writes down what they already

	know about the topic (K1) and what they want to learn (K2). At the end of the lesson, the student records what they have learned (K3). **• SWOT Analysis Method** This organizer develops students' skills in systematic thinking, comparison, evaluation, analysis, and logical continuation of ideas. The term SWOT is an abbreviation of English words: **Strengths** – strong aspects of the object; **Weaknesses** – weak aspects; **Opportunities** – external opportunities; **Threats** – external risks and threats. The student writes the letters S, W, O, and T on separate lines and lists the relevant characteristics of the object next to each letter. **• Brainstorming Method** This method is used to collect and evaluate ideas in order to find answers to questions related to the lesson topic. Each student puts forward their own ideas. The stages include: creating a problem situation; generating ideas and suggestions for solutions; listening to solution presentations; comparing and selecting solutions; and drawing conclusions. **• Problem-Based Learning Method** Initially, a problem-based video is shown. During the presentation, small groups identify and record problems. Afterwards, they exchange solutions and make necessary adjustments. Finally, a collective conclusion on the problem is formed. **• Venn Diagram** This method is used to compare studied objects, identify similarities and differences, and conduct analysis. The circles in the diagram represent separate objects, while the overlapping areas indicate their common and related features. Students are required to describe individual features (1–3), interrelated

	features (4–6), and common features (7) in written form. **• "Communication" Method** Separate topics are studied in small groups, and various materials (videos, photos, diagrams, scientific evidence) are prepared. Then communication takes place between the small groups. The teacher purposefully guides the groups' opinions and provides final feedback. **• Webinar Method** This is an interactive form of distance learning conducted with participants located in different places using modern information and communication technologies (computers, monitors, multimedia tools, etc.). **• Essay** An essay is a short prose work written in a free form that expresses the author's personal opinions, emotions, and reflections on a particular topic. **• Glossary** A glossary is a brief explanation of key terms and concepts related to a specific field or topic.

Requirements for obtaining loans:

To fully master the theoretical and methodological concepts of science, to be able to correctly reflect the results of the analysis, to independently observe the processes under study and carry out tasks and tasks assigned in current, intermediate forms of control, to submit a written work on final control.

Criteria for assessing and monitoring students' knowledge in the subject.

To assess educational outcomes, scores are assigned as follows:		
Current control bali	**Intermediate control bali**	Final control bali
For completing assignments given	**For answering during the midterm assessment –**	For answering during the final assessment – Final

during classroom sessions – Current Assessment (CA); **For completing independent learning tasks – Independent Work Assessment (IWA).**	**Midterm Assessment Score (MAS);** **For completing independent learning tasks – Independent Work Assessment (IWA).**	Assessment Score (FAS).

Criteria for assessing students' learning outcomes

Level	**5-point system (grade)**	**Mastery in %**	**Traditional**	**Assessment criteria**
For the Academic Department		**For the Professor/Instructor**		
A+	**4,51 – 5**	91 – 100	Excellent	The student quickly masters the material independently: makes no mistakes; actively participates in lessons; answers questions fully and accurately.
A	**4,26 – 4,5**	86 – 90		The student masters the material independently: makes no mistakes; answers questions fully and accurately.
B+	**4,01–4,25**	81 – 85	Good	The student has well mastered the material, can express it logically; actively participates in lessons; answers questions fully and accurately, but makes minor, non-serious mistakes.
B	**3,51 – 4,0**	71 – 80		The student has well mastered the material; answers questions fully and accurately, but makes minor, non-serious mistakes.
C+	**3,26 – 3,5**	66 – 70	Satisfactory	Knows the main material but has difficulty expressing it clearly; lacks accuracy and completeness in answering questions; makes some mistakes when presenting the material; experiences difficulties in the communication process.

C	**3,0 – 3,25**	60 – 65		Knows the main material but has difficulty expressing it clearly; lacks accuracy and completeness in answering questions; makes some mistakes when presenting the material.
F	**Under 3,0**	Under 60	Unsatisfactory	Has not mastered the material; cannot answer questions; does not participate in lessons.

ASSESSMENT CRITERIA

№	Types of assessment	Number of credits		Grade
		3		**5**
1. Final assessment total – 5		Number of seminars	Max. grade	Passing grade
1.1.	Workshop to actively participate in training and write a written synopsis of questions and give oral answers, perform control work (each para i.e. 2 hours are evaluated in one lesson)	3	5	3
1.2	Independent work		5	3
2. Midterm assessment total: 5 points				
2.1	1-Midterm assessment, written work	1	5	3
2.2	2-Midterm assessment, written work	1	5	3
Final assessment + Midterm assessment				5
3. Final Grade: **5 (Excellent)**				
3.1.	Final Assessment, Written Work (3 questions — based on the topics and independent work topics)	1	5	3
Total				5

Independent Study (IS)		In %
1	Preparation for seminar classes and completion of homework	25
2	Preparation of an independent work on the given topic	25
3	Writing a report on the given topic	24
4	Preparing an article for a scientific journal or a conference abstract	0

Primary Literature

1.	Yulchiyeva Z.N., Ruzmetova S.T. *Engineering Psychology*. Study guide. “Innovatsion rivojlanish Publishing-House” – Tashkent, 2023. 252 pages.

2.	Z. Kurbanova, D. Oribboyeva. *Labor and Engineering Psychology.* Study guide: “O’zkitobsavdo” Publishing, 2023. – 212 pages.
3.	Yusupova F.Z. *Professional Psychology: Textbook.* – Navoi: SCIENCE ALGORITHM, 2023. – 372 pages
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5.	Yulchiyeva Z.N. *Professional Psychology.* Textbook – Tashkent: Nodirabegim, 2021. – 360 pages.

Additional Literature

1.	Mirziyoyev Sh.M. *From National Revival to National Rise.* (4 volumes) – Tashkent: “O‘zbekiston” Publishing House, 2020. – 488 pages.
2.	Mirziyoyev Sh.M. *New Uzbekistan Development Strategy.* Second revised edition – Tashkent: “O‘zbekiston” Publishing House, 2022. – 416 pages.
3.	Mirziyoyev Sh.M. *Rule of Law and Ensuring Human Interests – Guarantee of National Progress and People’s Welfare.* Lecture dedicated to the 24th anniversary of the adoption of the Constitution of the Republic of Uzbekistan, December 7, 2016. – Tashkent: “O‘zbekiston” NMIU, 2016. – 48 pages.
4.	Mirziyoyev Sh.M. *Critical Analysis, Strict Discipline, and Personal Responsibility – Daily Rule for Every Leader.* Tashkent, Uzbekistan, 2017. – 104 pages
5.	Sergeev V.S. *Engineering Psychology and Ergonomics: Study Guide.* Moscow: NII of School Technologies, 2008. – 176 pages.
6.	Strelkov Yu.K. *Engineering and Professional Psychology: Textbook for University Students.* 2nd edition. Moscow: “Akademiya”, 2005. – 360 pages.
7.	Sergeev S.F. *Introduction to Engineering Psychology and Ergonomics of Immersive Environments.* Study guide. St. Petersburg: SPbSU ITMO Publishing, 2011. – 258 pages.
8.	Qodirov K.B. *Psychological Aspects of Career Choice Preparation and Professional Diagnosis.* – Tashkent, 2001

Information Sources:

1. Information sources
    1. www.tdpu.uz
    2. www.pedagog.uz
    3. www.edu.uz
    4. www.ziyonet.uz
    5. tdpu-INTRANET.Ped

When monitoring a student's learning outcomes in the course, the following criteria are recommended:

a) To receive a grade of 5 (Excellent), the student's level of knowledge must meet the following requirements:

- fully and comprehensively explain the essence and content of the course;
- present course topics in a scientific and logical manner, without scientific errors or confusion;
- have a clear understanding of the theoretical and/or practical significance of the course materials;
- demonstrate the ability to think independently and freely within the scope of the course;
- provide clear, precise, and concise answers to given questions;
- be thoroughly prepared with well-organized lecture notes;
- fully and accurately complete all independent assignments;
- master all required practical skills and competencies;
- be able to apply theoretical knowledge in various situations;
- demonstrate a systematic approach and logical consistency.

b) To receive a grade of 4 (Good), the student's level of knowledge must meet the following requirements:

- understand the essence and content of the course and avoid scientific or logical confusion when presenting topics;
- understand the practical significance of the course content;
- complete assigned tasks and assignments within the framework of the curriculum;
- correctly answer questions related to the course;
- maintain well-prepared and structured lecture notes;
- fully complete independent assignments;
- make efforts to master all practical skills and competencies.

c) To receive a grade of 3 (Satisfactory), the student's level of knowledge must meet the following requirements:

- have a general understanding of the course;
- present course topics within a limited scope, allowing some confusion in explanation;
- lack fluency and coherence in presentation;
- give vague and confusing answers to course-related questions;
- have poorly structured or insufficiently prepared written materials.

d) In the following cases, the student's level of knowledge may be assessed as 2 (Unsatisfactory):

- lack of preparation for course classes;
- absence of any understanding of the course content;
- noticeable plagiarism or copying of course materials from others;
- presence of serious errors and confusion in written work;
- failure to answer course-related questions;
- lack of knowledge of the subject.

Information about the Course Instructor

Author**:**	Shamiyeva Oybahor Ravshanovna, Candidate of Psychological Sciences, Associate Professor
E-mail:	oybahor_shamiyeva@gmail.com
Organization:	Navoi State Mining and Technologies University, Department of Social-Humanitarian Sciences and Physical Education
Reviewers:	Begmatov R. – Senior Lecturer, Department of General Pedagogy and Psychology, Navoi State Pedagogical Institute, PhD in Psychology, S.J. Bozorova – Professor, PhD in Psychology, Navoi State Mining and Technologies University

This syllabus was approved by the Academic-Methodological Council of the Faculty of Chemistry and Metallurgy at its meeting on _____, 2025, Protocol No. ___.

This syllabus was confirmed by the Department of "Social-Humanitarian Sciences and Physical Education" at its meeting on ___, 2025.

Head of Department: Sh.S. Norov

Compilers: O.R. Shamiyeva

REPUBLIC OF UZBEKISTAN
MINISTRY OF MINE AND GEOLOGY INDUSTRY
NAVOI STATE MINING AND TECHNOLOGY UNIVERSITY

Faculty of Chemistry and Metallurgy
Department of Social-Humanitarian Sciences and Physical Education

ENGINEERING PSYCHOLOGY
Methodological Guidelines for Independent Work

Navoi – 2025

The methodological guideline was reviewed at the meeting №_____ of the Department of “Social-Humanitarian Sciences and Physical Education” on “_____”, 2025.

Author:
Associate Professor **O.R. Shamiyeva**, Department of “Social-Humanitarian Sciences and Physical Education”, Navoi State Mining and Technology University

INTRODUCTION

Engineering psychology is a discipline that studies the processes of interaction between humans and technology from a psychological perspective. It plays a crucial role in enhancing the efficiency of modern production, transport, information systems, and other technical complexes. A deep understanding of this

subject enables students, in their future engineering activities, to accurately assess human factors, ensure safety, propose ergonomic solutions, and improve production processes.

This methodological guideline is aimed at the effective organization of independent study and pursues the following objectives:

- Deepening and reinforcing theoretical knowledge in the subject;
- Developing analytical thinking through solving practical tasks;
- Forming students' skills in independent research, selecting information sources, and analyzing them on a scientific basis.

The guideline has been developed in accordance with the higher education standards of the Republic of Uzbekistan, the curriculum of the "Engineering Psychology" course, and the study plan. It provides:

- Types of independent work and the procedures for their completion;
- Recommendations for searching literature and electronic sources;
- Methodological advice for working with scientific and technical texts, analyzing information, and preparing presentations.

This introduction helps students clearly understand the goals and objectives of independent work, as well as the methodological approaches necessary during its implementation. As a result, students acquire the ability to connect theoretical knowledge of engineering psychology with practical applications in their professional activities.

This methodological guideline for independent work in "Engineering Psychology" is recommended for undergraduate students for organizing, monitoring, and assessing independent work. Independent work is carried out under the supervision of relevant professors and instructors, according to the hours allocated per semester in the curriculum.

The guideline outlines the main forms and content of independent work, the tasks students must perform during its implementation, recommendations for organizing independent work, and the procedures for its monitoring and evaluation.

1. Purpose and Content of Independent Study

Independent work is an integral part of the educational process in the "Engineering Psychology" curriculum. Performing independent work supplements the theoretical knowledge gained during classroom sessions, allowing students to acquire practical skills, develop creative thinking, and engage

in scientific inquiry.

Independent work involves analyzing literature on the studied topics and expressing the student's own perspective. The main objectives of independent work are:

- To collect practical information on the topic and develop skills to work independently with methodological materials and literature;
- To conduct experiments, research, and analysis in the studied field;
- To form scientifically based conclusions and recommendations based on data analysis.

2. Organization of Independent Study

Choosing a Topic:
To select a topic, students are encouraged to:

- Identify problematic questions that arise during the study of the "Engineering Psychology" course;
- Review specially published articles and literature in the field of engineering psychology.

3. Developing a Work Plan and Monitoring Its Implementation
Supervisors collaborate with students to develop the assignment and the schedule for its completion.
The main stage of independent work is the development of an extended work plan by the student based on the assignment. The main deadlines are agreed upon, but the plan may change during the analysis of literature and materials on the topic.

4. Responsibilities in Preparing Independent Study

Instructor's Main Responsibilities:

- Assist students in selecting topics for independent work;
- Approve the chosen topic and monitor its execution;
- Approve the schedule for completing independent work and monitor adherence;
- Monitor the quality of independent work.

5. Responsibilities of the Scientific Supervisor:

- Develop tasks for students to carry out independent work;
- Provide guidance in preparing the work plan and selecting literature;
- Organize consultations according to the approved schedule, advise on data collection, analysis, generalization, and application;
- Regularly meet with students during the independent work process for

guidance and discussions;
- Monitor adherence to the schedule and the quality of the completed work;
- Provide organizational and methodological support during the independent work process.

6. Student Responsibilities

- Agree on the topic of the independent work;
- Agree on the schedule for completing the independent work and adhere to the specified deadlines;
- Submit the independent work within the set deadlines.

Procedure and Tasks for Completing Independent Work

A student's independent work is an integral part of mastering the "Engineering Psychology" course according to the curriculum. It is supported with methodological and informational resources and monitored according to the requirements of the assessment system.

At the end of the semester, the grade for a student's independent work, together with the grades received for classroom work, is recorded in the group grade book, the student's rating record, and in the diploma supplement issued upon graduation.

The primary goal of independent work is to develop and enhance the student's knowledge and skills necessary to independently complete certain educational tasks under the guidance and supervision of the instructor.

Objectives of Independent Work:

- Develop the ability to independently acquire new knowledge;
- Identify convenient methods and tools for finding the required information;
- Effectively use information sources and references;
- Work with traditional educational and scientific literature, as well as regulatory documents;
- Utilize electronic educational resources and databases;
- Make rational decisions in solving assigned tasks;
- Analyze data;
- Prepare work results for expert evaluation and refine them based on expert feedback;
- Approach tasks systematically and creatively.

Forms of Independent Work:
Considering the academic level and abilities of students in "Engineering Psychology," the following forms may be used:

- Independent study of theoretical topics using textbooks and scientific literature;
- Preparing an informational report (essay) on a given topic;
- Preparing for seminars and practical sessions;
- Applying theoretical knowledge in practice and solving existing problems (case studies);
- Preparing scientific articles or presentation theses for conferences.

Based on the specifics of the "Engineering Psychology" course, students may also use other forms of independent work.

Organization and Guidance:
Independent work assignments in "Engineering Psychology" are prepared by the department professor (or leading associate professor) in collaboration with the instructor conducting the course and approved by the head of the department. The assignment provides initial instructions and recommendations for completing the independent work.

Students are provided with textbooks, manuals, methodological guidelines, databases, scientific and popular periodicals, relevant Internet resources, and previous works on the topic as information sources for completing their work.

Independent work is graded according to the allocated hours in the course syllabus, and the results are included in the student's overall course rating. Students' performance, including independent work, is regularly tracked in the traditional group rating sheet and the faculty's electronic system.

Types of control and assessment criteria for independent work are established by the relevant department and approved by the Faculty Academic Council. Assessment criteria are distributed to students at the beginning of the academic year along with methodological materials. A student who scores less than 3 points out of the maximum for independent work is not allowed to take the final course examination.

Students' progress in independent work for "Engineering Psychology" is regularly reviewed within student groups and at department meetings. Students' independent work is preserved throughout the academic year.

Forms and Content of Independent Work

Each student, when preparing their independent work, is recommended to use the following forms, taking into account the specific features of the subject:

- Study chapters and topics of the subject using textbooks and educational manuals;
- Master lecture materials provided in handouts;

- Work on sections or topics of the subject using specialized literature;
- Deeply study sections and topics related to the student's own educational and research work;
- Participate in educational activities that use active and problem-based teaching methods;
- Engage in distance (remote) learning.

Criteria for Assessing Independent Work

Independent work is evaluated on a scale with a maximum grade of 5. The grade is based on the written independent work submitted by the student on the assigned topic.

The assessment is based on the following exemplary criteria:

5 – Excellent:

- Ability to draw conclusions and make decisions; creative thinking;
- Ability to conduct independent reasoning and apply acquired knowledge in practice;
- Understanding the essence of the material; able to explain, describe, and visualize concepts.

4 – Good:

- Ability to conduct independent reasoning and apply knowledge in practice;
- Understanding the essence of the material; able to explain, describe, and visualize concepts.

3 – Satisfactory:

- Understanding the essence of the material; able to explain, describe, and visualize concepts.

2 – Unsatisfactory:

- Failure to master the program; lack of understanding of the subject; inability to form a clear conception; inability to think independently; inability to summarize or outline the topic.

Recommended Topics for Independent Work (according to the sample program):	Form of Independent Work	**Allocated Hours**

№1	**Preparing a report on one of the following topics:** 2. Motivations of labor activity. 3. Personality psychology and its formation. 4. Motivations for choosing an engineering profession. 5. The operator's work in modern complex automated "Human–Machine" systems. 6. Professional adaptation, inability to adapt, readaptation, "professional adaptation" and its contributing factors. 7. Types of incidents: accidents, catastrophes, disasters. 8. Studying the objective and subjective causes of accidents and failures and preventing them. 9. Crises in the professional development of a person. 10. The development of a person as a labor subject at different stages of life.		20
№2	**Preparing a presentation on one topic:** 1. Criteria of personal maturity and their use in employee management practice. 2. Stages of labor subject development in professionalization. 3. Concept of labor organization psychology. 4. Concept of work quality. 5. Decision-making in engineering activity. 6. Professional maturity of a person 7.		16
№3	Emotional-volitional sphere of a person and professional adaptation	Analyze scientific literature and prepare an essay.	8
№4	**Abilities, speech, and profession**	Study the topic and create 5 test questions related to the topic.	8
№5	**Information and psychological safety at work**	Work with the text and analyze it using the SWOT analysis method.	10
№6	Self-respect and professional self-awareness.	Create 5 glossary entries related to the topic.	10
Total			**72**

Main (or Core) Literature / References

1.	Yulchiyeva Z.N., Ruzmetova S.T. *Engineering Psychology.* Study guide.

	"Innovatsion rivojlanish Publishing-House" – Tashkent, 2023. 252 pages.
2.	Z. Kurbanova, D. Oribboyeva. *Labor and Engineering Psychology.* Study guide: "O'zkitobsavdo" Publishing, 2023. – 212 pages.
3.	Yusupova F.Z. *Professional Psychology: Textbook.* – Navoi: SCIENCE ALGORITHM, 2023. – 372 pages.
4.	Ronald E. Riggio, Stefanie K. Johnson: *Introduction to Industrial / Organizational Psychology.* New York, 2022.
5.	Yulchiyeva Z.N. *Professional Psychology.* Textbook – Tashkent: Nodirabegim, 2021. – 360 pages.

Additional Literature:

9.	Mirziyoyev Sh.M. *From National Revival to National Rise.* (4 volumes) – Tashkent: "O'zbekiston" Publishing House, 2020. – 488 pages.
10.	Mirziyoyev Sh.M. *New Uzbekistan Development Strategy.* Second revised edition – Tashkent: "O'zbekiston" Publishing House, 2022. – 416 pages.
11.	Mirziyoyev Sh.M. *Rule of Law and Ensuring Human Interests – Guarantee of National Progress and People's Welfare.* Lecture dedicated to the 24th anniversary of the adoption of the Constitution of the Republic of Uzbekistan, December 7, 2016. – Tashkent: "O'zbekiston" NMIU, 2016. – 48 pages.
12.	Mirziyoyev Sh.M. *Critical Analysis, Strict Discipline, and Personal Responsibility – Daily Rule for Every Leader.* Tashkent, Uzbekistan, 2017. – 104 pages.
13.	Sergeev V.S. *Engineering Psychology and Ergonomics: Study Guide.* Moscow: NII of School Technologies, 2008. – 176 pages.
14.	Strelkov Yu.K. *Engineering and Professional Psychology: Textbook for University Students.* 2nd edition. Moscow: "Akademiya", 2005. – 360 pages.
15.	Sergeev S.F. *Introduction to Engineering Psychology and Ergonomics of Immersive Environments.* Study guide. St. Petersburg: SPbSU ITMO Publishing, 2011. – 258 pages.
16.	Qodirov K.B. *Psychological Aspects of Career Choice Preparation and Professional Diagnosis.* – Tashkent, 2001.

Information Sources:

1. www.tdpu.uz
2. www.pedagog.uz
3. www.edu.uz
4. www.ziyonet.uz
5. tdpu-INTRANET.Ped

GLOSSARY
Concepts of Engineering Psychology and Professional Activity

1. **Apperception** — perception influenced by previous experience.
2. **Adaptation** — the psychological process of adjusting to new work conditions.
3. **Accent** — a strong or dominant characteristic in a person’s character.
4. **Algorithm** — step-by-step rules for solving problems or performing work processes.
5. **Analysis** — the process of breaking down information or processes into components for study.
6. **Questionnaire method** — a method of collecting information through written questions.

7. **Apperception** — perception dependent on prior experience.
8. **Information exchange** — signal, command, or indicator exchange between an operator and a machine.
9. **Biodynamics** — the study of human physical activity and body reactions.
10. **Biogenetic theory** — the concept that personal traits are influenced by biological factors.
11. **Cognitive activity** — the process of receiving, storing, and processing information.
12. **Attention** — the conscious focus on a particular object.
13. **Types of attention** — voluntary, involuntary, post-voluntary attention.
14. **Ergonomics** — the science of adapting work conditions to human physical and psychological capabilities.
15. **Ergonomic requirements** — criteria ensuring safety, comfort, and efficiency in work conditions.
16. **Spatial perception** — the ability to perceive distance, position, and shape.
17. **Feedback** — exchange of responses and signals between an operator and a system.
18. **Humanization** — making work and technical systems comfortable, safe, and psychologically satisfying.
19. **Emotional-volitional sphere** — psychological traits related to emotions, desires, and will.
20. **Emotional state** — feelings such as fear, anxiety, stress, and others.
21. **Holland's typology** — Realistic, Intellectual, Social, Conventional, Enterprising, Artistic personality types.
22. **Will** — the conscious striving toward a goal.
23. **Innovation** — implementation of new technologies or work methods.
24. **Professional motive** — an internal factor motivating career choice.
25. **Professional adaptation** — the process of psychological adjustment to work conditions.
26. **Professional ability** — a set of traits required for a specific profession.
27. **Professional development** — the process of career maturation.
28. **Career choice motives** — material, social, interest, self-expression, security.
29. **Klimov classification** — classification of personality preferences: man–nature, man–technology, man–man, symbols, artistic images.
30. **Qualification** — the set of knowledge and skills necessary for successful professional activity.
31. **Machine properties** — technical qualities such as precision, reliability, speed.
32. **Work efficiency** — the ratio of results to labor resources.
33. **Methodology** — principles of conducting scientific research.
34. **Modeling** — studying a real process through a model.
35. **Motivation** — psychological processes that drive activity.
36. **Motivation management** — methods of stimulating and encouraging employee activity.

37. **Engineering psychology** — the scientific and applied study of interactions between humans and technology.
38. **Neuroses** — psychological disorders resulting from professional activity.
39. **Operator** — a person controlling a technical process.
40. **Operator process** — the system of actions performed by an operator in technical and work conditions.
41. **Operator activity** — processes of monitoring, controlling, analyzing, and decision-making.
42. **Psychodiagnostics** — methods for identifying and assessing psychological traits.
43. **Psychophysiology** — the study of psychological and physiological processes in humans.
44. **Psychogram** — the set of psychological traits necessary for a specialist.
45. **Professionography** — studying the psychological characteristics of a profession.
46. **Professionogram** — description of requirements for a profession.
47. **Decision-making** — analyzing information and choosing actions.
48. **Reactive actions** — automatic responses to external conditions.
49. **Mental state** — the psychological and emotional condition of a person (anxiety, mood, stress).
50. **Personal psychogram** — the set of a specialist's psychological traits.
51. **Personal qualities** — stable behavioral and psychological traits (responsibility, determination, patience).
52. **Simulation** — recreating and studying a real process through a conditional model.
53. **Stress** — mental tension caused by work or conditions.
54. **Repetition** — reinforcing learned information in memory.
55. **Thinking** — process of problem-solving, generalization, and analysis.
56. **Types of thinking** — theoretical, practical, visual-imaginative, logical.
57. **Temperament** — innate psychodynamic traits of personality (choleric, sanguine, phlegmatic, melancholic).
58. **Technical aesthetics** — studying the form, convenience, beauty, and practicality of technical devices.
59. **Technical process** — activities performed in technology and production systems.
60. **Character** — stable social-psychological traits of a person.
61. **Memory** — the process of storing and recalling information.
62. **Types of memory** — short-term, long-term, voluntary, involuntary.
63. **Chronometry** — measurement of work processes in time.
64. **Workload** — the physical, psychological, and informational load on an operator or employee.

✅ENGINEERING PSYCHOLOGY – CONTROL TESTS

📌 TOPIC 1: Fundamentals of Engineering Psychology (20 questions)

1. What is the main subject of engineering psychology?
   A) Studying the structure of technology
   B) Studying the interaction between humans and technology ✓
   C) Only the physiological aspects of activity
   D) Teaching career choice
2. What does the human–technology system include?
   A) Only the operator
   B) Operator, technical means, and control ✓
   C) Computer and software
   D) Only the machine
3. Who is an operator?
   A) Manufacturer
   B) A person controlling a technical process ✓
   C) Only an observer
   D) Programmer
4. What does ergonomics study?
   A) Machine design
   B) Scientific organization of labor
   C) Human and work environment compatibility ✓
   D) Physiology of activity
5. Methodology is:
   A) Experimental result
   B) Principles of scientific research ✓
   C) Behavior method
   D) Measuring instrument
6. Which category does the questionnaire method belong to?
   A) Diagnostic method ✓
   B) Modeling
   C) Observation
   D) Experiment
7. What does chronometry measure?
   A) Workers’ mood
   B) Work time ✓
   C) Physiological state
   D) Operator ability
8. Modeling is:
   A) Analyzing a machine
   B) Studying a real process through a model ✓
   C) Mathematical calculation
   D) Risk assessment
9. Who proposed the psychological classification of professions?
   A) Holland
   B) Klimov ✓
   C) Maslow
   D) Freud

10. Which group exists in Klimov’s classification?
    A) Human – money
    B) Human – recreation
    C) Human – technology ✓
    D) Not human – nature
11. Professionography is:
    A) Technical analysis
    B) Detailed psychological study of a profession ✓
    C) Determining physiological norms
    D) Supervising operator work
12. Professionogram is:
    A) Description of profession requirements ✓
    B) Technical document
    C) Work schedule
    D) Physical map of activity
13. Psychogram is:
    A) Operator action schedule
    B) Set of necessary psychological traits of a specialist ✓
    C) Labor analysis
    D) Technical instruction
14. Engineering psychology is related to which sciences?
    A) Mathematics and biology
    B) Psychology, ergonomics, physiology ✓
    C) History and art
    D) Chemistry and geography
15. The main element of operator activity:
    A) Drawing
    B) Control ✓
    C) Writing
    D) Teaching
16. What is labor operation recording?
    A) Video recording
    B) Recording objective time and movements ✓
    C) Analyzing thoughts
    D) Oral survey
17. Which belongs to empirical methods?
    A) Observation ✓
    B) Mathematical model
    C) Statistics
    D) Research plan
18. When did engineering psychology begin to develop?
    A) 12th century
    B) 19th–20th centuries ✓
    C) 17th century
    D) 15th century

19. What does technical aesthetics study?
    A) Machine mechanics
    B) Comfort and beauty principles of technology ✓
    C) Work productivity
    D) Process charts
20. The most accurate definition of “operator”:
    A) Robot controlling work
    B) Person controlling a technical process ✓
    C) Computer program
    D) Thinking subject
21. Information exchange is:
    A) Pouring oil into a machine
    B) Signal exchange between operator and system ✓
    C) Idea exchange
    D) Safety instructions
22. Main task of operator labor:
    A) Assembly
    B) Control and supervision ✓
    C) Drawing
    D) Machine repair
23. How do machine properties affect operator activity?
    A) Do not affect at all
    B) Determine work speed and accuracy ✓
    C) Only change design
    D) Increase noise
24. Professional motive is:
    A) Appearance
    B) Factor motivating a person to act ✓
    C) Qualification
    D) Emotional state
25. Motivation is understood as:
    A) Stopping activity
    B) Psychological process that drives work ✓
    C) Only material incentive
    D) Stress
26. Career choice motives include:
    A) Interest
    B) Material benefit
    C) Self-expression
    D) All of the above ✓
27. How does the biogenetic theory explain personality?
    A) Social influence
    B) Biological inheritance ✓
    C) Economic status
    D) Technology

28. According to the sociogenetic theory, a person:
    A) Is formed by hereditary traits
    B) Is formed under environmental influence ✓
    C) Remains the same
    D) Does not change
29. Types of attention are correctly given in:
    A) Involuntary, forced
    B) Voluntary, involuntary, post-voluntary ✓
    C) Active, passive
    D) Conscious and unconscious
30. Apperception is:
    A) Psychological method of perception
    B) Formation of perception influenced by prior experience ✓
    C) Only vision process
    D) Main type of imagination
31. Professional development stage means:
    A) Decreasing interest in profession
    B) Achieving proficiency in a specific profession ✓
    C) Not starting work
    D) Doing all professions
32. What does spatial perception provide for an operator?
    A) Measuring time
    B) Determining location and distance ✓
    C) Strengthening thinking
    D) Reducing stress
33. Internal factor determining a career:
    A) Prestige
    B) Ability ✓
    C) Material demand
    D) Age
34. Main goal of motivation management:
    A) Punish worker
    B) Increase worker activity ✓
    C) Reduce work time
    D) Disable the system
35. Attention requirement in an engineer:
    A) Easily distracted
    B) Stable, strong, and distributed ✓
    C) Not using attention
    D) Only visual perception

📌 TOPIC 3: Cognitive Processes and Personality Traits (15 questions)

36. Memory is:
    A) Ability to express thoughts
    B) Process of storing and recalling information ✓
    C) Feeling
    D) Visual reflex
37. Types of memory correctly:
    A) Short-term and long-term ✓
    B) Sensory and perception
    C) Conscious and unconscious
    D) Real and virtual
38. Main function of thinking:
    A) Control actions
    B) Solve problems ✓
    C) Reduce noise
    D) Enhance memory
39. Types of thinking include:
    A) Theoretical, practical ✓
    B) Color, black-white
    C) Formal, informal
    D) Subjective, objective
40. Temperament is:
    A) Behavioral trait
    B) Innate psychodynamic characteristic ✓
    C) Newly learned trait
    D) Random action
41. Which temperament is best suited for engineering activity?
    A) Choleric
    B) Sanguine
    C) Phlegmatic + sanguine ✓
    D) Melancholic
42. Character is:
    A) Innate reaction
    B) Socially formed stable traits ✓
    C) Natural reflex
    D) Random mood
43. Which belongs to professional abilities?
    A) Hearing
    B) Analysis, attention, spatial perception ✓
    C) Voice pitch
    D) Balance
44. Emotional states include:
    A) Joy, happiness
    B) Anxiety, fear, stress ✓
    C) Falling asleep
    D) Idle state

45. Professional neuroses are caused by:
    A) Excessive workload ✓
    B) Only good rest
    C) Swimming exercises
    D) Drawing
46. Main task of will:
    A) Strengthen desire
    B) Conscious action toward goal ✓
    C) Random reactions
    D) Form habit
47. Professional adaptation is:
    A) Lack of interest in work
    B) Psychological adjustment to work conditions ✓
    C) Only physiological adjustment
    D) Reducing ability
48. Important feature of operator thinking:
    A) Slowness
    B) Flexibility ✓
    C) Randomness
    D) Emotionality
49. What does “simulation” mean?
    A) Recreating a real process in a model ✓
    B) Canceling a task
    C) Damaging technology
    D) Hiding emotions
50. Workload is:
    A) Loading a machine
    B) Informational and physical pressure on an operator ✓
    C) Lifting weight
    D) Means of reducing stress