MINISTRY OF SCIENCE AND HIGHER EDUCATION
OF THE RUSSIAN FEDERATION

FEDERAL STATE AUTONOMOUS EDUCATIONAL INSTITUTION OF HIGHER EDUCATION
"NORTH CAUCASUS FEDERAL UNIVERSITY"

SUGGESTIONS FOR TEACHING

for the organization and conduct of independent work
students in the discipline "Intelligent Control System" for students of the direction of training
11.03.02 Infocommunication Technologies and Communication Systems, Profile Intelligent Data Processing in Infocommunication Systems and Networks

Stavropol, 2026

Methodical instructions for the organization of students' independent work are compiled in accordance with the requirements of the program of the discipline "Intelligent Control System" for bachelors of the direction of training 11.03.02. The textbook is devoted to the planned educational work of students, carried out in extracurricular (classroom) time on the assignment and under the methodological guidance of the teacher, but without his direct participation, with partial, direct participation of the teacher.

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1. Independent work as the most important form of the educational process

Independent work is the planned educational, research, research work of students, performed in extracurricular (classroom) time on the assignment and under the methodological guidance of the teacher, but without his direct participation (with the partial direct participation of the teacher, leaving the leading role in the work of students).

Independent work of students at the university is an important type of educational and scientific activity of the student. Independent work of students plays a significant role in the rating technology of education. Education at the university includes two parts that are almost the same in volume and mutual influence - the process of learning and the process of self-study. Therefore, the SRS should become an effective and purposeful work of the student.

The concept of modernization of Russian education defines the main tasks of vocational education - "training a qualified worker of the appropriate level and profile, competitive in the labor market, competent, responsible, fluent in his profession and oriented in related fields of activity, capable of effective work in the specialty at the level of world standards, ready for constant professional growth, social and professional mobility."

The solution of these problems is impossible without increasing the role of students' independent work on educational material, increasing the responsibility of teachers for the development of independent work skills, for stimulating the professional growth of students, fostering creative activity and initiative.

Society imposes a fairly wide range of requirements on a modern specialist, among which it is important that graduates have certain abilities and the ability to independently obtain knowledge from various sources, systematize the information received, and assess a specific financial situation. The formation of such a skill occurs during the entire period of study through the participation of students in laboratory or practical classes, in the performance of control tasks and tests, writing term papers and graduation qualification papers. At the same time, the independent work of students plays a decisive role in the entire educational process.

The forms of independent work of students are diverse. In this discipline "Intelligent Management System" the following are provided:

Use of the material of the educational and methodological complex of the discipline

At the first stage, it is necessary to familiarize yourself with the mandatory minimum content of the basic educational program in the discipline studied. Next, it is necessary to study the work program of the discipline, which considers the content of

the topics of the discipline of the lecture course, the relationship between the topics of lectures of laboratory/practical classes, topics and types of independent work.

Work with literature

For the successful development of the discipline, it is necessary to independently study the presented topics in detail according to the recommended sources of information that are presented in the curriculum.

Independent work introduces students to scientific creativity, the search for and solution of urgent modern problems.

2. Goals and main objectives of the ACS

The leading goal of the organization and implementation of SRS should coincide with the goal of teaching a student - the preparation of a bachelor with higher education. In the organization of SRS, an important and necessary condition is the formation of the ability to work independently to acquire knowledge, skills and the ability to organize educational and scientific activities.

The purpose of students' independent work is to master fundamental knowledge, professional skills and abilities in the profile, experience in creative and research activities. Independent work of students contributes to the development of independence, responsibility and organization, a creative approach to solving problems of the educational and professional level.

The objectives of the SRS are:

– systematization and consolidation of the theoretical knowledge and practical skills of students;

– deepening and expanding theoretical knowledge;

– formation of skills to use regulatory, legal, reference documentation and special literature;

– development of cognitive abilities and activity of students: creative initiative, independence, responsibility and organization;

– formation of independent thinking, abilities for self-development, self-improvement and self-realization;

– development of research skills;

– the use of material collected and obtained in the course of independent studies at seminars, laboratory classes, when writing term papers and final qualification papers, for effective preparation for final tests and exams.

3. Types of independent work

In the educational process of a higher professional educational institution, two

types of independent work are distinguished: classroom, under the guidance of a teacher, and extracurricular. A close relationship between these types of work provides for differentiation and effectiveness of the results of its implementation and depends on the organization, content, logic of the educational process (interdisciplinary connections, promising knowledge, etc.):

Classroom independent work on the discipline is carried out in classes under the direct guidance of the teacher and on his assignment.

Extracurricular independent work is performed by the student on the instructions of the teacher, but without his direct participation.

The main types of independent work of students without the participation of a teacher in this discipline are:

– formation and assimilation of the content of lecture notes on the basis of educational literature recommended by the lecturer, including information educational resources (electronic textbooks, electronic libraries, etc.);

– preparation for laboratory or practical work, their design.

The main types of independent work of students with the participation of teachers are:

– ongoing consultations;

– acceptance and defense of laboratory work (during the L/R, if they are provided for by the curriculum);

– performance of tasks in practical classes (if they are provided for by the curriculum of the discipline);

– the implementation of a term paper or project, if they are provided for by the curriculum.

4. Organisation of SSDs

The methodology for organizing students' independent work depends on the structure, nature and features of the discipline "Intelligent Control System", the number of hours for its study, the type of tasks for students' independent work, the individual qualities of students and the conditions of educational activity.

The process of organizing students' independent work includes the following stages:

– preparatory (definition of goals, drawing up a program, preparation of methodological support, preparation of equipment);

– the main one (implementation of the program, the use of methods of information search, assimilation, processing, application, transfer of knowledge, recording of results, self-organization of the work process);

– final (assessment of the significance and analysis of the results, their

systematization, assessment of the effectiveness of the program and methods of work, conclusions about the directions of labor optimization).

Students' Activities for the Formation and Development of Skills of Educational Independent Work

In the process of independent work, the student acquires the skills of self-organization, self-control, self-management, self-reflection and becomes an active independent subject of educational activity.

Performing independent work under the supervision of a teacher, the student must:

– master the minimum content submitted for independent work of students and proposed by the teacher in accordance with the Federal State Educational Standards of Higher Education;

– plan independent work in accordance with the schedule of independent work proposed by the teacher;

– the student must carry out independent work in the organizational forms provided for by the curriculum and the teacher's work program;

– perform independent work and report on its results in accordance with the schedule for submitting results, types and terms of reporting on students' independent work.

A student can:

in addition to the minimum mandatory content proposed by the teacher (with justification and agreement with him) determined by the program for this discipline:

– independently determine the level (depth) of the study of the content of the material;

– to suggest topics and questions for independent study;

– within the framework of the general schedule for the performance of independent work, offer a reasonable individual schedule for the implementation and reporting on the results of independent work;

– offer their own options for organizational forms of independent work;

– to use for independent work methodological manuals, manuals, developments in addition to the list proposed by the teacher;

– to use not only control, but also self-control of the results of independent work in accordance with the methods of self-control proposed by the teacher or chosen independently.

Independent work of students should have an important impact on the formation of the personality of the future professional, it is planned by the student independently.

Each student independently determines the mode of his work and the degree of work spent on mastering the educational content in each discipline. He performs extracurricular work according to a personal individual plan, depending on his training, time and other conditions.

5. General recommendations for the organization of independent work

The main form of independent work of a student is the study of lecture notes, their supplementation, recommended literature, active participation in laboratory or practical classes (depending on the curriculum). But for successful educational activity, its intensification, it is necessary to take into account the following subjective factors:

1. Knowledge of school program material, the presence of a solid system of gaps necessary for mastering the main university courses. This is especially important for mathematical and engineering disciplines. It is necessary to distinguish gaps in knowledge that make it difficult to assimilate new material from small abilities. By spending effort to overcome these gaps, the student will ensure normal academic performance and believe in his abilities.

2. Availability of skills, skills of mental work:

a) the ability to take notes at lectures and when working with a book;

b) mastery of logical operations: comparison, analysis, synthesis, generalization, definition of concepts, rules of systematization and classification.

3. The specifics of cognitive mental processes: attention, memory, speech, observation, intelligence and thinking. Poor development of each of them becomes a serious obstacle in learning.

4. Good working capacity, which is provided by normal physical condition. After all, serious learning is a large, versatile and diverse work. The result of learning is evaluated not by the amount of information communicated, but by the quality of its assimilation, the ability to use it and the development of one's ability for further independent education.

5. Correspondence of the chosen activity, profession to individual abilities. It is necessary to develop the ability to regulate one's emotional state and eliminate circumstances that disturb the business mood, interfere with the planned work.

6. Mastering the optimal style of work that ensures success in activities. Alternating work and pauses in work, rest periods, individually justified sleep duration, preference for evening or morning classes, stress resistance at exams and features of preparation for them,

7. The level of requirements for oneself, determined by the existing self-esteem. Adequate assessment of knowledge, advantages, disadvantages is an important component of a person's self-organization, without it it is impossible to successfully manage one's behavior and activity.

One of the main features of education in higher school is that constant external control is replaced by self-control, the active role in learning belongs not so much to the teacher as to the student.

Knowing the basic methods of scientific organization of mental work, it is possible to achieve the best results with the least expenditure of time, money and labor efforts.

The effectiveness of assimilation of incoming information depends on the working capacity of a person at a particular moment of his activity.

Working capacity is the ability of a person to work with a high degree of intensity for a certain time. There are internal and external factors of working capacity.

Internal factors of working capacity include intellectual characteristics, will, and state of health.

External:

– organization of the workplace, work and rest schedule;

– the level of labor organization - the ability to obtain information and use information;

– the amount of mental load.

The outstanding Russian physiologist N. E. Vvedensky identified the following conditions for the productivity of mental activity:

– every work must be entered into gradually;

– dimensionality and rhythm of work. Different people have a more or less different pace of work;

– the usual sequence and systematicity of activity;

– correct alternation of work and rest.

Rest does not imply obligatory complete inaction on the part of a person, it can be achieved by a simple change of business. During the day, the working capacity changes. The most fruitful is the *morning time (from 8 to 14 hours),* and the maximum working capacity falls on the period from 10 to 13 hours, then *the afternoon* (from 16 to 19 hours) and *the evening* (from 20 to 24 hours). It is better to study the material that is very difficult to understand at the beginning of each period of time (preferably in the morning) after a good rest. After 1-1.5 hours, breaks of 10 - 15 minutes are needed, after 3 - 4 hours of work, the rest should be long - about an hour.

An integral part of the scientific organization of mental labor is the mastery of the technique of mental labor.

The time that the student has to complete the curriculum consists of two components: one of them is classroom work at the university according to the schedule of classes, the other is extracurricular independent work. Tasks and materials for independent work are given during classes according to the schedule, in the same

classes the teacher controls independent work, and also assists students in the correct organization of work.

Self-study will require intensive mental work, which must not only be properly organized, but also stimulated. At the same time, it is very important to be able to maintain steady attention to the material being studied. The development of attention requires significant volitional efforts. That is why, if a student notices that he is often distracted during independent studies, he needs to force himself to concentrate. Such a procedure must be done constantly, as this is attention training. Sustained attention appears when a person treats the matter with interest.

It is necessary to properly organize your classes in time: 50 minutes - work, 5-10 minutes - break; after 3 hours of work, a break - 20-25 minutes. Otherwise, increasing fatigue will lead to instability of attention. A very significant factor affecting the increase in mental performance is systematic physical education. The organization of active recreation provides for the alternation of mental and physical activity, which completely restores a person's working capacity.

6. Independent work of a student is a necessary link in the formation of a researcher

The progress of science and technology, information technology leads to a significant increase in scientific information, which imposes higher requirements not only on the moral and ethical qualities of a person, but also, in particular, constantly increasing requirements in the field of education - renewal, modernization of general and professional knowledge, skills of a specialist.

Any education should act as a dynamic process inherent in a person and continuing throughout his life. Mastering scientific thought and the language of science is a necessary component in the self-organization of a future research specialist. This is understood not so much as the accumulation of knowledge, but the mastery of scientifically based ways of acquiring it. This, generally speaking, is the main task of the university.

The specificity of the university educational process, in the organization of which more and more space is given to the independent work of the student, is that it is as if it is the last and most adequate link for the implementation of this task. Since during study at the university, the development of style, skills of educational (cognitive) activity takes place, the rational nature of which will contribute to the constant renewal of the knowledge of a highly qualified university graduate.

However, there are certain difficulties before this path, in particular, the transition of the student from the synthetic process of learning in secondary school to the analytical one in higher school. This is due both to the new content of education (expansion of general education and deepening of professional training) and to new,

hitherto unknown forms of training (lectures, seminars, laboratory classes, etc.). The student receives not only the knowledge provided by the program and teaching aids, but he must also become familiar with the ways of acquiring knowledge in such a way as to be able to assess what we know, how we know it and how we have achieved this knowledge. All this is achieved through one's own independent work.

This is also because self-acquired knowledge is more operational, it becomes personal property, as well as a motive for behavior, develops intellectual traits, attention, observation, criticality, and the ability to evaluate. The role of the teacher is mainly to guide the accumulation of knowledge (in relation to first-year students), and in the subsequent years of study, in the senior years, in the joint identification of problems and care for the student's independent search, as well as control over their activities. It should be noted that it is not possible to limit oneself only to the acquisition of knowledge provided for by the program of the discipline studied, it is necessary to constantly deepen the knowledge gained, focusing it on some narrow certain area corresponding to the interests of the student. In-depth study of all subjects provided for by the program is possible in practice, and good organization of work allows you to save time, which creates conditions for a deep, systematic, interested study of the topic independently chosen by the student.

Of course, all the advice, examples, recommendations in this area, given by the teacher, or certain publications, or other sources, do not guarantee any success without the manifestation of one's own activity in this matter, i.e. they do not give ready-made recipes, but should contribute to the analysis of one's own work, its goals, organization in accordance with individual characteristics. Taking into account personal capabilities, existing living and working conditions, skills, on the basis of these recommendations, it is possible to develop an individually justified set of methods, ways, find one's own style or improve it, so that, having studied certain material, have time to assess its significance, suitability and possibilities of its application, in order to ultimately ensure the success of one's studies from future professional activity

7. Methodical recommendations for students on certain forms of independent work

The system of university education implies much greater independence of students in planning and organizing their activities.

Work with literature

When working with literature, it is necessary to select literature, learn how to read it correctly, and keep notes. For the selection of literature in the library, alphabetical and systematic catalogs are used.

It is important to remember that rational skills of working with a book are always

a great saving of time and effort.

The correct selection of textbooks is recommended by the teacher who reads the lecture course. The necessary literature can also be indicated in the methodological developments for this course.

Studying the material from the textbook, you should move on to the next question only after the correct understanding of the previous one, describing on paper all the calculations and calculations (including those that are omitted in the textbook or given in the lecture for independent conclusion).

In the study of any discipline, independent individual work plays a large and important role.

Particular attention should be paid to the definition of the basic concepts of the course. The student should analyze in detail the examples that explain such definitions, and be able to build similar examples independently. It is necessary to achieve an accurate idea of what you are studying. It is useful to make reference notes. When studying the material from the textbook, it is useful to supplement the lecture notes in the notebook (in specially designated margins). There you should also note the questions selected by the student for consultation with the teacher.

It is recommended to highlight the conclusions obtained as a result of the study in the notes so that they are better remembered when rereading the notes.

Experience shows that many students are helped by compiling a list of reference signals containing the most important and most frequently used formulas and concepts. Such a sheet helps to memorize formulas, the main points of the lecture, and can also serve as a permanent reference for the student. There are two types of reading: primary and secondary. *Primary reading* is attentive, unhurried reading, in which you can dwell on difficult places. It should not leave a single incomprehensible tin. The content cannot always be understood after the initial reading.

The task *of secondary* reading is the complete assimilation of the meaning of the whole (this reading may not be the second, but the third or fourth).

Reading a scientific text is a part of cognitive activity. Its purpose is to extract the necessary information from the text. The effectiveness of the action largely depends on how conscious the reader is of his own inner attitude when referring to the printed word (to find the necessary information, to assimilate the information fully or partially, to critically analyze the material, etc.).

There are four main attitudes in reading a scientific text:

1. information-retrieval (the task is to find, highlight the information sought);

2. assimilative (the reader's efforts are aimed at understanding and remembering as fully as possible both the information presented by the author and the entire logic of his reasoning);

3. analytical-critical (the reader seeks to critically comprehend the material,

analyzing it, determining his attitude to it);

4. creative (creates in the reader a readiness in one form or another – as a starting point for his reasoning, as an image for action by analogy, etc. – to use the author's judgments, the course of his thoughts, the result of observation, the developed methodology, to supplement them, to subject them to a new check).

The existence of several types of reading ***is associated with the presence of different attitudes to addressing a scientific text***:

1. bibliographic – viewing catalog cards, recommendation lists, summary lists of journals and articles for the year, etc.;

2. browsing – used to search for materials containing the necessary information, it is usually resorted to immediately after working with references and catalogs, as a result of such a review, the reader establishes which of the sources will be used in further work;

3. introductory – implies a continuous, sufficiently detailed reading of the selected articles, chapters, individual pages, the purpose is to get acquainted with the nature of the information, to find out what issues are submitted by the author for consideration, to sort the material;

4. studying – involves a thorough mastery of the material; in the course of such reading, the reader's trust in the author, readiness to accept the information presented, the attitude to the most complete understanding of the material is realized;

5. Analytical-critical and creative reading are two types of reading that are close to each other in that they participate in solving research problems. The first of them involves a directed critical analysis of both the information itself and the ways of its receipt and presentation by the author; the second is the search for those judgments, facts, on which or in connection with which, the reader considers it necessary to express his own thoughts.

Of all the types of reading considered, the main one for students is the learning one - it allows them to accumulate knowledge in various fields when working with educational literature. That is why this type of reading should be mastered in the first place. In addition, when mastering this type of reading, the main techniques are formed that increase the effectiveness of working with a scientific text.

The main types of systematized recording of what has been read:

1. Annotation is an extremely brief coherent description of the book (article) viewed or read, its contents, sources, nature and purpose;

2. Planning is a brief logical organization of the text, revealing the content and structure of the studied material;

3. Thesis is a concise reproduction of the author's main statements without involving factual material;

4. Quotation is a verbatim excerpt from the text of excerpts, extracts that most

significantly reflect one or another thought of the author;

5. Note-taking is a brief and consistent presentation of the content of what has been read.

A synopsis is a complex way of presenting the content of a book or article in a logical sequence. A synopsis accumulates the previous types of notes, allows you to comprehensively cover the content of a book or article. Therefore, the ability to make a plan, theses, make extracts and other notes determines the technology of compiling a synopsis.

Methodical recommendations for compiling a synopsis:

1. Read the text carefully. Clarify the incomprehensible words in the reference literature. When writing down, do not forget to put the reference data in the margins of the note.

2. Highlight the main thing, make a plan.

3. Briefly formulate the main provisions of the text, note the author's argumentation.

4. Take notes of the material, clearly following the points of the plan. When taking notes, try to express the idea in your own words. Notes should be kept clearly.

5. Write down quotes correctly. When quoting, take into account the conciseness and significance of the thought.

In the text of the synopsis, it is desirable to give not only thesis statements, but also their proofs. When drawing up a synopsis, it is necessary to strive for the capacity of each sentence. The thoughts of the author of the book should be stated briefly, taking care of the style and expressiveness of what is written. The number of additional elements of the synopsis should be logically justified, the notes should be distributed in a certain sequence that corresponds to the logical structure of the work. Margins should be left for clarification and addition.

Mastering the skills of taking notes requires purposefulness and daily independent work from the student.

Laboratory/Practical Classes (depending on the curriculum)

It should be emphasized that only after mastering the lecture material from a certain point of view (namely, from the point of view from which it is presented at the lectures), it will be consolidated in laboratory or practical classes both as a result of discussion and analysis of the lecture material, and with the help of performing tasks of laboratory or practical work, tasks. Under these conditions, the student will not only learn the material well, but also learn to apply it in practice, and will also receive an additional incentive (and this is very important) for active study of the lecture.

When performing tasks independently, it is necessary to justify each stage of the

solution, based on the theoretical provisions of the course. If the student sees several ways to solve a problem (task), then it is necessary to compare them and choose the most rational one. It is useful to make a brief plan for solving the problem (task) before starting calculations. The solution of problems or examples should be presented in fractions, calculations should be arranged in a strict order, separating auxiliary calculations from the main ones. Solutions, if necessary, should be accompanied by comments, diagrams, drawings and drawings.

It should be remembered that the performance of each educational task should be carried out before the final logical answer required by the condition, and, if possible, with a conclusion. The performance of tasks of this type should be continued until the acquisition of solid skills in solving them.

Self-Test

After studying a certain topic from the notes in the notes and textbook, as well as solving a sufficient number of relevant tasks in laboratory classes and independently, the student is recommended, using a sheet of reference materials, to reproduce from memory definitions, conclusions of formulas, formulations of the main provisions and evidence.

If necessary, you need to carefully understand the material again.

Sometimes the insufficiency of assimilation of a particular issue becomes clear only when studying further material. In this case, it is necessary to go back and repeat the poorly mastered material. An important criterion for mastering theoretical material is the ability to solve problems or pass a test on the material covered. However, it should be remembered that the correct solution to the problem can be obtained as a result of the use of mechanically memorized formulas without understanding the essence of theoretical provisions.

Consulting

If in the process of independent work on the study of theoretical material or when performing tasks, the student has questions that cannot be solved independently, it is necessary to contact the teacher to obtain explanations or instructions from him. In his questions, the student should clearly express what he is experiencing difficulties, the nature of this difficulty. Advice should also be sought if there are doubts about the correctness of the answers to the self-test questions.

Preparation for the exam in the discipline "Intelligent Control System"

The study of many general professional and special disciplines ends with an exam. Preparation for the exam contributes to the consolidation, deepening and generalization of knowledge obtained in the process of learning, as well as its application to solving practical problems. Preparing for it, the student eliminates the existing gaps in knowledge, deepens, systematizes and organizes his knowledge.

To successfully pass the exam, it is important for the student to fully complete

the tasks of practical work during the semester, prepare a report on each work and a report on the results of independent study of topics, according to the curriculum.

Systematic preparation for classes during the semester will allow you to use the time of the exam session to systematize knowledge.

The current certification of students is carried out by teachers who conduct practical classes in the discipline in the following forms: an interview when defending practical work tasks with the provision of a written (or in electronic form) report, depending on the requirements.

8. Educational, methodological and information support of the discipline

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