ANNOTATION OF THE PROGRAM
Foreign language

Course: 1 2, semester ы : 1 2 3 4

		Semester			
№	**Kind of activity**	**1**	**2**	**3**	**4**
1	Total credits	2	3	3	2
2	Total hours	72	108	108	72
3	Total classes in the contact form, hours	45	84	84	45
4	Lectures, hours	0	0	0	0
5	Practical lessons, hours	36	72	72	36
6	Laboratory studies, hours	0	0	0	0
7	of them in an active and interactive form, hours	10	30	24	8
8	Consultations, hours	7	10	10	7
9	Independent work, hours	27	24	24	27

External requirements

is able to search, critical analysis and synthesis of information, apply a systematic approach to solving the set Tasks; ***regarding the following learning results*****:**
is able to carry out business communication in oral and written forms in the state language of the Russian Federation and foreign language (AH); ***regarding the following learning results*****:**
to be able to: apply in practice business communication in oral and writing forms, methods and skills of business communication in Russian and foreign languages.
to know: the principles of building an oral and written statement in Russian and foreign yaz sir; Rules and patterns of business oral and written communication.
to own: the skills of reading and transferring texts in a foreign language in professional communications; skills of business communications in oral and writing in Russian and foreign languages; The methodology for compiling a judgment in interpersonal business communication in Russian and foreign languages.

Requirements for the results of mastering the discipline

The results of the study of the discipline	**Forms of organizing classes**
1. UK-1. 1 1. Know: search methods, collecting and processing information; topical Russian and foreign sources of information in the field of professional activities; Method of system analysis.	Seminars; Independent work
to know: the principles of building an oral and written statement in Russian and foreign yaz sir; Rules and patterns of business oral and written communication.	

2. UK-4. 1 1. To know: the principles of building an oral and written statement in Russian and foreign languages; Rules and patterns of business oral and written communication.	Seminars; Independent work
to be able to: apply in practice business communication in oral and writing forms, methods and skills of business communication in Russian and foreign languages.	
3. UK-4. 2 2. To be able to: apply in practice business communication in oral and written forms, methods and skills of business communication in Russian and foreign languages.	Seminars; Independent work
to own: the skills of reading and transferring texts in a foreign language in professional communications; skills of business communications in oral and writing in Russian and foreign languages; The methodology for compiling a judgment in interpersonal business communication in Russian and foreign languages.	
4. UK-4. 3 3. To own: the skills of reading and translating texts in a foreign language in professional communication; skills of business communications in oral and writing in Russian and foreign languages; Methodology for the preparation of judgment in interpersonal business communication in Russian and foreign languages.	Seminars; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 1				
Didactic unit: Sensor characteristics				

1. Personal information	2	4	2, 3	-Vacrement of training lexico-grammatical exercises - Iphodia of microdialoga and its reproduction - Remember the dialogs and monologues and their reproduction-reproduction of sample proposals - Reproduction of microdial files (by role) - The text of the text out loud in compliance with the correct rhythm and intonation (according to sample) - Playing text by keywords and / or by plan (short retelling) - A brief oral presentation on a given topic (with preliminary preparation and without) - Creating your own connected text in the form of a monologue or dialogue using keywords and expressions -Formulation issues to text - Representations to questions on the text -Telection of foreign equivalents to Russian words and expressions -Serivate Russian equivalents to foreign words and expressions - recording keywords and text expressions (read or heard)

2. Presentation: Basic rules and techniques		4	2, 3	- memorization of monologues and play them - Reproduction of sample proposals - Playing text by keywords and / or by plan (short retelling) - A brief oral presentation on a given topic (with preliminary preparation and without) - create your own connected text in the form of a monologue using keywords and expressions -Formulation issues to text - Representations to questions on the text -Telection of foreign equivalents to Russian words and expressions -Serivate Russian equivalents to foreign words and expressions - Oral statement of questions on the report (listeners) -Atranny answers to questions on the report (speaker) -With presentation on a given topic (with preliminary preparation)

3. System of higher education in Russia	2	8	1, 2, 3, 4	- Performing training lexico-grammatical exercises - issue of dialogs and monologues and their reproduction - Reproduction of sample proposals - The text of the text out loud in compliance with the correct rhythm and intonation (according to sample) - Present fixing keywords while listening to text and drawing up a text plan -Crath and detailed retelling of text based on the plan - Playing text by keywords and / or by plan (short retelling) - A brief oral presentation on a given topic (with preliminary preparation and without) - Creating your own connected text in the form of a monologue or dialogue using keywords and expressions -Formulation issues to text - Representations to questions on the text -Telection of foreign equivalents to Russian words and expressions -Serivate Russian equivalents to foreign words and expressions - recording keywords and text expressions (read or heard)

4. My university. NGTU	2	6	1, 2, 3, 4	- Performing training lexico-grammatical exercises - Iphodia of microdialoga and its reproduction - Reproduction of sample proposals - Reproduction of microdial files (by role) - The text of the text out loud in compliance with the correct rhythm and intonation (according to sample) - Playing text by keywords and / or by plan (short retelling) - A brief oral presentation on a given topic (with preliminary preparation and without) - Creating your own connected text in the form of a monologue or dialogue using keywords and expressions -Formulation issues to text - Representations to questions on the text -Telection of foreign equivalents to Russian words and expressions -Serivate Russian equivalents to foreign words and expressions - recording keywords and expressions of text (read or heard)

5. The system of higher education in the country of the language under study	4	14	1, 2, 3, 4	- Execution Train County lexico-grammatical exercises - Iphodia of microdialoga and its reproduction - issue of dialogs and monologues and their reproduction - Reproduction of sample proposals - Reproduction of microdial files (by role) - The text of the text out loud in compliance with the correct rhythm and intonation (according to sample) - Playing text by keywords and / or by plan (short retelling) - A brief oral presentation on a given topic (with preliminary preparation and without) - Creating your own connected text in the form of a monologue or dialogue using keywords and expressions -Formulation issues to text - Representations to questions on the text -Telection of foreign equivalents to Russian words and expressions -Serivate Russian equivalents to foreign words and expressions - recording keywords and expressions of text (read or heard)
Semester: 2				
Didactic unit: Sensor characteristics				

6. Urbanization problems	2	4	1, 2, 3, 4	- Performing training lexico-grammatical exercises -time text when listening and repeating the speaker - Present fixing keywords while listening to text and drawing up a text plan Scratched Retelling / Detailed Retelling Listed Text - The text of the text out loud in compliance with the correct rhythm and intonation (according to sample) - A brief oral presentation on a given topic (with preliminary preparation) - create your own connected dough in the form of a monologue or dialogue using keywords and expressions -Set the plan of the read text -Formulation issues to text - Representations to questions on the text -Crath and detailed retelling of text based on the plan - Suiting your own text (oral and writing) on ??a given topic using words and expressions allocated in the original -Ell text on a given topic using words and expressions allocated in the original -Itended translation of text on the native / foreign language

7. Modern software products for the integrated automation of power supply systems.	2	10	1, 2, 3, 4	- Performing training lexico-grammatical exercises -time text when listening and repeating the speaker - Present fixing keywords while listening to text and drawing up a text plan Scratched Retelling / Detailed Retelling Listed Text - The text of the text out loud in compliance with the correct rhythm and intonation (according to sample) - A brief oral presentation on a given topic (with preliminary preparation) - create your own connected dough in the form of a monologue or dialogue using keywords and expressions -Set the plan of the read text -Formulation issues to text - Representations to questions on the text -Crath and detailed retelling of text based on the plan - Suiting your own text (oral and writing) on ??a given topic using words and expressions allocated in the original -Ell text on a given topic using words and expressions allocated in the original -Itended translation of text on the native / foreign language

8. Native city	2	6	1, 2, 3, 4	- Performing training lexico-grammatical exercises -time text when listening and repeating the speaker - Present fixing keywords while listening to text and drawing up a text plan Scratched Retelling / Detailed Retelling Listed Text - The text of the text out loud in compliance with the correct rhythm and intonation (according to sample) - A brief oral presentation on a given topic (with preliminary preparation) - create your own connected dough in the form of a monologue or dialogue using keywords and expressions -Set the plan of the read text -Formulation issues to text - Representations to questions on the text -Crath and detailed retelling of text based on the plan - Suiting your own text (oral and writing) on ??a given topic using words and expressions allocated in the original -Ell text on a given topic using words and expressions allocated in the original -Itended translation of text on the native / foreign language

9. Environmental problems of the modern city	4	8	1, 2, 3, 4	- Performing training lexico-grammatical exercises -time text when listening and repeating the speaker - Present fixing keywords while listening to text and drawing up a text plan Scratched Retelling / Detailed Retelling Listed Text - The text of the text out loud in compliance with the correct rhythm and intonation (according to sample) - Holding the analyzed information in charts and tables - A brief oral presentation on a given topic (with preliminary preparation) - create your own connected dough in the form of a monologue or dialogue using keywords and expressions -Set the plan of the read text -Formulation issues to text - Representations to questions on the text -Crath and detailed retelling of text based on the plan - Suiting your own text (oral and writing) on ??a given topic using words and expressions allocated in the original -Ell text on a given topic using words and expressions allocated in the original - Written P
10. Outstanding scientists and their contribution to science	2	6	1, 2, 3, 4	. Subsystems generated by multiple. Congrunce, factor algebra. Grilles. Boolean algebras. 2.3. Permutations and substitutions. Substitution groups. Presentation of substitution in the form of a product of transpositions. Accommodation and combination. Properties of binomial coefficients. Placement and combinations with repetitions. Split. Method of inclusion and exception.

11. Laureates of the Nobel Prize	2	6	1, 2, 3, 4	. Subsystems generated by multiple. Congrunce, factor algebra. Grilles. Boolean algebras. 2.3. Permutations and substitutions. Substitution groups. Presentation of substitution in the form of a product of transpositions. Accommodation and combination. Properties of binomial coefficients. Placement and combinations with repetitions. Split. Method of inclusion and exception.
12. Great inventions	4	8	1, 2, 3, 4	. Subsystems generated by multiple. Congrunce, factor algebra. Grilles. Boolean algebras. 2.3. Permutations and substitutions. Substitution groups. Presentation of substitution in the form of a product of transpositions. Accommodation and combination. Properties of binomial coefficients. Placement and combinations with repetitions. Split. Method of inclusion and exception.
13. Prospects for the development of technical science	2	4	1, 2, 3, 4	. Subsystems generated by multiple. Congrunce, factor algebra. Grilles. Boolean algebras. 2.3. Permutations and substitutions. Substitution groups. Presentation of substitution in the form of a product of transpositions. Accommodation and combination. Properties of binomial coefficients. Placement and combinations with repetitions. Split. Method of inclusion and exception.

14. Computers	2	4	1, 2, 3, 4	- Performing training lexico-grammatical exercises -time text when listening and repeating the speaker - Present fixing keywords while listening to text and drawing up a text plan Scratched Retelling / Detailed Retelling Listed Text - The text of the text out loud in compliance with the correct rhythm and intonation (according to sample) - A brief oral presentation on a given topic (with preliminary preparation) - create your own connected dough in the form of a monologue or dialogue using keywords and expressions -Set the plan of the read text -Formulation issues to text - Representations to questions on the text -Crath and detailed retelling of text based on the plan - Suiting your own text (oral and writing) on ??a given topic using words and expressions allocated in the original - Dialogue - Exchange of views (according to the designated issues)
15. Hardware	2	4	1, 2, 3, 4	. Subsystems generated by multiple. Congrunce, factor algebra. Grilles. Boolean algebras. 2.3. Permutations and substitutions. Substitution groups. Presentation of substitution in the form of a product of transpositions. Accommodation and combination. Properties of binomial coefficients. Placement and combinations with repetitions. Split. Method of inclusion and exception.

16. Software	2	4	1, 2, 3, 4	. Subsystems generated by multiple. Congrunce, factor algebra. Grilles. Boolean algebras. 2.3. Permutations and substitutions. Substitution groups. Presentation of substitution in the form of a product of transpositions. Accommodation and combination. Properties of binomial coefficients. Placement and combinations with repetitions. Split. Method of inclusion and exception.
17. the Internet	4	8	1, 2, 3, 4	- Performing training lexico-grammatical exercises -time text when listening and repeating the speaker - Present fixing keywords while listening to text and drawing up a text plan Scratched Retelling / Detailed Retelling Listed Text - The text of the text out loud in compliance with the correct rhythm and intonation (according to sample) - A brief oral presentation on a given topic (with preliminary preparation) - create your own connected dough in the form of a monologue or dialogue using keywords and expressions -Set the plan of the read text -Formulation issues to text - Representations to questions on the text -Crath and detailed retelling of text based on the plan - Suiting your own text (oral and writing) on ??a given topic using words and expressions allocated in the original - Dialogue - Exchange of views (according to the designated issues)
Semester: 3				
Didactic unit: Sensor characteristics				

18. What is engineering	2	4	1, 2, 3, 4	. Subsystems generated by multiple. Congrunce, factor algebra. Grilles. Boolean algebras. 2.3. Permutations and substitutions. Substitution groups. Presentation of substitution in the form of a product of transpositions. Accommodation and combination. Properties of binomial coefficients. Placement and combinations with repetitions. Split. Method of inclusion and exception.
19. Profession of engineer	2	6	1, 2, 3, 4	- Performing training lexico-grammatical exercises -time text when listening and repeating the speaker - Present fixing keywords while listening to text and drawing up a text plan Scratched Retelling / Detailed Retelling Listed Text - The text of the text out loud in compliance with the correct rhythm and intonation (according to sample) - A brief oral presentation on a given topic (with preliminary preparation) - create your own connected dough in the form of a monologue or dialogue using keywords and expressions -Set the plan of the read text -Formulation issues to text - Representations to questions on the text -Crath and detailed retelling of text based on the plan - Suiting your own text (oral and writing) on ??a given topic using words and expressions allocated in the original - Dialogue - Exchange of views (according to the designated issues)

20. Engineer of the XXI century	2	4	1, 2, 3, 4	. Subsystems generated by multiple. Congrunce, factor algebra. Grilles. Boolean algebras. 2.3. Permutations and substitutions. Substitution groups. Presentation of substitution in the form of a product of transpositions. Accommodation and combination. Properties of binomial coefficients. Placement and combinations with repetitions. Split. Method of inclusion and exception.
21. Engineering materials	2	10	1, 2, 3, 4	- Performing training lexico-grammatical exercises -time text when listening and repeating the speaker - Present fixing keywords while listening to text and drawing up a text plan Scratched Retelling / Detailed Retelling Listed Text - The text of the text out loud in compliance with the correct rhythm and intonation (according to sample) - A brief oral presentation on a given topic (with preliminary preparation) - create your own connected dough in the form of a monologue or dialogue using keywords and expressions -Set the plan of the read text -Formulation issues to text - Representations to questions on the text -Crath and detailed retelling of text based on the plan - Suiting your own text (oral and writing) on ??a given topic using words and expressions allocated in the original - Dialogue - Exchange of views (according to the designated issues)

22. Nanotechnology	4	8	1, 2, 3, 4	. Subsystems generated by multiple. Congrunce, factor algebra. Grilles. Boolean algebras. 2.3. Permutations and substitutions. Substitution groups. Presentation of substitution in the form of a product of transpositions. Accommodation and combination. Properties of binomial coefficients. Placement and combinations with repetitions. Split. Method of inclusion and exception.
23. bioengineering	2	8	1, 2, 3, 4	. Subsystems generated by multiple. Congrunce, factor algebra. Grilles. Boolean algebras. 2.3. Permutations and substitutions. Substitution groups. Presentation of substitution in the form of a product of transpositions. Accommodation and combination. Properties of binomial coefficients. Placement and combinations with repetitions. Split. Method of inclusion and exception.

24. Robotics and automation	4	12	1, 2, 3, 4	- Performing training lexico-grammatical exercises -time text when listening and repeating the speaker - Present fixing keywords while listening to text and drawing up a text plan Scratched Retelling / Detailed Retelling Listed Text - The text of the text out loud in compliance with the correct rhythm and intonation (according to sample) - A brief oral presentation on a given topic (with preliminary preparation) - create your own connected dough in the form of a monologue or dialogue using keywords and expressions -Set the plan of the read text -Formulation issues to text - Representations to questions on the text -Crath and detailed retelling of text based on the plan - Suiting your own text (oral and writing) on ??a given topic using words and expressions allocated in the original - Dialogue - Exchange of views (according to the designated issues)
25. New energy sources	2	8	1, 2, 3, 4	. Subsystems generated by multiple. Congrunce, factor algebra. Grilles. Boolean algebras. 2.3. Permutations and substitutions. Substitution groups. Presentation of substitution in the form of a product of transpositions. Accommodation and combination. Properties of binomial coefficients. Placement and combinations with repetitions. Split. Method of inclusion and exception.

26. Preparation of future engineers	4	12	1, 2, 3, 4	. Subsystems generated by multiple. Congrunce, factor algebra. Grilles. Boolean algebras. 2.3. Permutations and substitutions. Substitution groups. Presentation of substitution in the form of a product of transpositions. Accommodation and combination. Properties of binomial coefficients. Placement and combinations with repetitions. Split. Method of inclusion and exception.
Semester: 4				
Didactic unit: Sensor characteristics				
27. Job search	4	12	1, 2, 3, 4	. Subsystems generated by multiple. Congrunce, factor algebra. Grilles. Boolean algebras. 2.3. Permutations and substitutions. Substitution groups. Presentation of substitution in the form of a product of transpositions. Accommodation and combination. Properties of binomial coefficients. Placement and combinations with repetitions. Split. Method of inclusion and exception.

28. Summary and cover letter to it		4	1, 2, 3, 4	- Performing training lexico-grammatical exercises -time text when listening and repeating the speaker - Present fixing keywords while listening to text and drawing up a text plan Scratched Retelling / Detailed Retelling Listed Text - The text of the text out loud in compliance with the correct rhythm and intonation (according to sample) - A brief oral presentation on a given topic (with preliminary preparation) - create your own connected dough in the form of a monologue or dialogue using keywords and expressions -Set the plan of the read text -Formulation issues to text - Representations to questions on the text -Crath and detailed retelling of text based on the plan - Suiting your own text (oral and writing) on ??a given topic using words and expressions allocated in the original - Dialogue - Exchange of views (according to the designated issues)

29. Interview when receiving a job	2	8	1, 2, 3, 4	- Performing training lexico-grammatical exercises -time text when listening and repeating the speaker - Present fixing keywords while listening to text and drawing up a text plan Scratched Retelling / Detailed Retelling Listed Text - The text of the text out loud in compliance with the correct rhythm and intonation (according to sample) - A brief oral presentation on a given topic (with preliminary preparation) - create your own connected dough in the form of a monologue or dialogue using keywords and expressions -Set the plan of the read text -Formulation issues to text - Representations to questions on the text -Crath and detailed retelling of text based on the plan - Suiting your own text (oral and writing) on ??a given topic using words and expressions allocated in the original - Dialogue - Exchange of views (according to the designated issues)

30. Structure of a modern company	2	12	1, 2, 3, 4	- Performing training lexico-grammatical exercises -time text when listening and repeating the speaker - Present fixing keywords while listening to text and drawing up a text plan Scratched Retelling / Detailed Retelling Listed Text - The text of the text out loud in compliance with the correct rhythm and intonation (according to sample) - A brief oral presentation on a given topic (with preliminary preparation) - create your own connected dough in the form of a monologue or dialogue using keywords and expressions -Set the plan of the read text -Formulation issues to text - Representations to questions on the text -Crath and detailed retelling of text based on the plan - Suiting your own text (oral and writing) on ??a given topic using words and expressions allocated in the original - Dialogue - Exchange of views (according to the designated issues)

Literary sources

Main literature

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Additional literature

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Internet resources

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2. http://elibrary.nstu.ru/

3. Электронно-библиотечная система НГТУ [Электронный ресурс] : электронно-библиотечная система. – [Россия], 2011. – Режим доступа: http://elibrary.nstu.ru/. – Загл. с экрана.

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5. Хэррис Д. М. Цифровая схемотехника и архитектура компьютера[Электронный ресурс] / Д. М. Хэррис, С. Л. Хэррис. -2-е изд. - [Нью Йорк] : Morgan Kaufman, 2013. - 1684 с. - Режим доступа: https://community.imgtec.com/downloads/digital-design-and-computer-architecture-russian-edition-second-edition. - Загл. с экрана.

6. http://www.iprbookshop.ru/

7. http://znanium.com/

Methodical support and software

Methodological support

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2. Кудинова Ю. С. Английский язык. Базовый курс. Science, Technology and Outstanding People in the Field [Электронный ресурс] : электронный учебно-методический комплекс / Ю. С. Кудинова ; Новосиб. гос. техн. ун-т. - Новосибирск, [2016]. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000232755. - Загл. с экрана.

3. Калинкина О. А. Company Structure [Электронный ресурс] : электронный учебно-методический комплекс / О. А. Калинкина, Т. Б. Ганичева ; Новосиб. гос. техн. ун-т. - Новосибирск, [2016]. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000232555. - Загл. с экрана.

4. Иностранный язык для технических специальностей (Information Technologies) [Электронный ресурс] : электронный учебно-методический комплекс / М. Н. Гордеева, О. С. Атаманова, О. В. Иванова, Ю. С. Кудинова ; Новосиб. гос. техн. ун-т. - Новосибирск, [2016]. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000232750. - Загл. с экрана.

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6. Калинина Е. Г. Ecological Problems [Электронный ресурс] : электронный учебно-методический комплекс / Е. Г. Калинина ; Новосиб. гос. техн. ун-т. - Новосибирск, [2016]. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000232658. - Загл. с экрана.

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Specialized software

1 Calculator of the cost and timing of the project and its stages according to the COCOMO COCOMO® II.2000.4 methodology

2 Microsoft Office Application Pack

ANNOTATION OF THE PROGRAM

Course: 1, semester : 1

		Semester
№	**Kind of activity**	**1**
1	Total credits	3
2	Total hours	108
3	Total classes in the contact form, hours	66
4	Lectures, hours	36
5	Practical lessons, hours	18
6	Laboratory studies, hours	0
7	of them in an active and interactive form, hours	18
8	Consultations, hours	10
9	Independent work, hours	42

External requirements

is able to search, critical analysis and synthesis of information, apply a systematic approach to solving the set Tasks; *regarding the following learning results*:
To be able to: apply search, collection and information processing techniques; Creit analysis and synthesis of information obtained from different sources; Apply the system approach to solve the tasks set.
is able to perceive the intercultural diversity of society in socio-historical ohm, ethical and philosophical contexts; *regarding the following learning results*:
has practical experience in analyzing philosophical and historical facts, the experience of assessing cultural phenomena.
knows the main categories of philosophy, the laws of historical development, the basics of intercultural communication.

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes
To be able to: apply search, collection and information processing techniques; Creit analysis and synthesis of information obtained from different sources; Apply the system approach to solve the tasks set.	
1. UK-2. 1 1. Formulates in the framework of the draft project the set of tasks providing its achievement	Seminars; Independent work

knows the main categories of philosophy, the laws of historical development, the basics of intercultural communication.

2. UK-5. 1 1. Know the main categories of philosophy, the laws of historical development, the basics of intercultural communication.	Lections; Seminars; Independent work

has practical experience in analyzing philosophical and historical facts, the experience of assessing cultural phenomena.

3. UK-8. 3 3. Owns the victim first aid skills.	Seminars; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 1				
Didactic unit: from the primitive and the ancient world to the new time.				
1. History of how science, periodization.		2	2	Lectures
2. Primitive society. Ancient world. Slavs in antiquity.		2	2	Lecture
3. Formation of feudalism: barbaric kingdoms, Byzantium. The emergence of the ancient Russian state.		2	2	Lecture
4. Classic feudalism in Europe. The flourishing of the ancient Russian state.		2	2	Lecture
5. Feudal fragmentation in Europe. Russia specific period, the period of finding Russian principalities in the Tataromongol Empire.		2	2	Lecture
6. Later Middle Ages or Early New Time in Europe. The emergence of the Moscow state.		2	2	Lecture
Didactic unit: New time.				
7. The beginning of the referee: the main trends in the economic, political, social and cultural development of Europe. Development of a Moscow centralized state.		2	2	Lecture
8. Moscow State in the context of the history of Europe of the XVI-XVII centuries.		2	2	Lecture
9. the flourishing of colonial empires. Board of Peter I. Epoch of palace coups.		2	2	Lecture

10. The first half of the XIX century: the main trends of economic, social, political development. Russian Empire during the reign of Alexander I and Nicholas I.		2	2	Lecture
11. The second half of the XIX century: the main trends of economic, social and political development. The Epoch of the Ref Phone and Councilforms in the Russian Empire.		2	2	Lecture
12. Start XX century: Development of orperialism and monopolistic capitalism. World War I. Revolutionary stories in the Russian Empire.		2	2	Lecture
Didactic unit: Latest time				
13. The consequences of the First World War: change the geopolitical map of the world. Civil War in the territories of the former Russian Iperia. Education of the USSR.		2	2	Lecture
14. Peace in the pre-war period: Great depression, the arrival of fascist parties to power, Stalinist modernization.		2	2	Lecture
15. The Second World War. The Great Patriotic War.		2	2	Lecture
16. Peace after World War II: Start the opposition of two systems.		2	2	Lecture
17. Deploying the Cold War. Tendency Development of the state of the capitalist and socialist system.		2	2	Lecture
18. Disintegration of the USSR. Major trends in world development at the beginning of XXI.		2	2	Lecture

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 1				
Didactic unit: from the primitive and the ancient world to the new time.				
1. Theoritical aspects of historical knowledge.	2	2	1, 2, 3	Practical (seminars) occupation
2. Ancient world.	2	2	1, 2, 3	Practical (seminars) occupation
3. Middle Ages.	2	2	1, 2, 3	Practical (Seminar) Claim.
Didactic unit: New time.				

4. Early new time.	2	2	1, 2, 3	Practical (seminars) occupation
5. Europe and Russia at the end of the XVII - XVIII centuries.	2	2	1, 2, 3	Practical (seminars) occupation
6. The main trends in the development of Europe and the Russian Empire in the XIX century.	2	2	1, 2, 3	Practical (Seminar) Lesson
Didactic unit: Latest time				
7. Revolutionary processes at the beginning of XX .	2	2	1, 2, 3	Practical (seminars) occupation
8. Great Domestic War	2	2	1, 2	Practical (seminars) occupation
9. World in the second half of the XX - early XXI centuries.	2	2	1, 2, 3	Practical (seminars) occupation

Table 3.3

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 1				
Didactic unit: from the primitive and the ancient world to the new time.				
1. The main stages of periodization of the development of historical knowledge.		1	1, 2, 3	CRS
2. Ancient Egypt: Features of political and economic development.		1	1, 2, 3	CRS
3. Ancient Greece: features of political and economic development.		1	1, 2, 3	CRS
4. Ancient China Features of Political and Economic Development.		1	1, 2, 3	CRS
5. Ancient Rome: Features of politics and economic development.		1	1, 2, 3	CRS
6. Development of the kingdom of francs V - IX centuries.		1	1, 2, 3	CRS
7. Stages of development of ancient Russian state with IX in the XII centuries.		1	1, 2, 3	CRS
Didactic unit: New time.				
7. Education of the national states in Europe		2	2	CRS
8. Great geographical discoveries and also role in the genesis of capitalism in Europe		1	1, 2, 3	CRS
9. Reformation		1	2	CRS
10. First bourgeois revolutions in Europe.		1	1, 2, 3	CRS
11. Troubled Time in the Russian State.		1	1, 2, 3	CRS

12. External and internal policy of Catherine II		1	1, 2, 3	CRS
13. socio-political idea in Russia XIX century.		1	1, 2, 3	CRS
14. Start of parliamentarism in Russia.		1	1, 2, 3	CRS
Didactic unit: Latest time				
15. Civil War in Russia.		2	1, 2, 3	CRS
16. NEP		1	1, 2	CRS
17. Industrialization and collectivization in the USSR.		2	1, 2, 3	CRS
18. The contribution of the rear in the victory in the Great Patriotic War		2	1, 2, 3	CRS
19. Spell in the USSR.		2	1, 2, 3	CRS
20. Evolution of capitalism in the second half of the XX century.		2	1, 2, 3	CRS

Literary sources

Main literature

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Additional literature

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Internet resources

1. Historie. История цивилизаций [Электронный ресурс]. - 2011-2016. - Режим доступа: http://www.historie.ru/. - Загл. с экрана.

2. http://elibrary.nstu.ru/

3. Arzamas : [сайт]. – [Москва], 2021. – URL: https://arzamas.academy/ (дата обращения: 26.02.2021). – Текст : электронный.

4. https://e.lanbook.com/

5. ПостНаука : [сайт] / Издательский дом «ПостНаука». – 2012– . – URL: https://postnauka.ru/ (дата обращения: 25.02.2021). – Текст : электронный.

6. http://www.iprbookshop.ru/

7. http://znanium.com/

Methodical support and software

Methodological support

1. Воробьева Э. А. История (История России. Всеобщая история) [Электронный ресурс] : электронный учебно-методический комплекс / Э. А. Воробьева ; Новосиб. гос. техн. ун-т. - Новосибирск, [2020]. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000242166. - Загл. с экрана.

2. История : планы семинарских занятий и методические рекомендации / Новосиб. гос. техн. ун-т ; [сост. И. Г. Адоньева]. - Новосибирск, 2016. - 13, [1] с.. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000230307

Specialized software

Использование специализированного программного обеспечения для изучения дисциплины не требуется

ANNOTATION OF THE PROGRAM

Philosophy

Course: 2, semester : 3

		Semester
№	**Kind of activity**	**3**
1	Total credits	3
2	Total hours	108
3	Total classes in the contact form, hours	66
4	Lectures, hours	36
5	Practical lessons, hours	18
6	Laboratory studies, hours	0
7	of them in an active and interactive form, hours	12
8	Consultations, hours	10
9	Independent work, hours	42

External requirements

is able to search, critical analysis and synthesis of information, apply a systematic approach to solving the set Tasks; ***regarding the following learning results*****:**
own: search methods, collection and processing, critical analysis and information synthesis; method of a systematic approach to solving the tasks.
To be able to: apply search, collection and information processing techniques; Creit analysis and synthesis of information obtained from different sources; Apply the system approach to solve the tasks set.
is able to perceive the intercultural diversity of society in socio-historical ohm, ethical and philosophical contexts; ***regarding the following learning results*****:**
has practical experience in analyzing philosophical and historical facts, the experience of assessing cultural phenomena.
knows the main categories of philosophy, the laws of historical development, the basics of intercultural communication.

Requirements for the results of mastering the discipline

The results of the study of the discipline	**Forms of organizing classes**

knows the main categories of philosophy, the laws of historical development, the basics of intercultural communication.

1. to know the background of the appearance of philosophical knowledge	Lections; Seminars; Independent work
2. to know the subject, sections and functions of philosophy	Lections; Seminars; Independent work
3. to know the iterative methods for solving real and complex sludge with rarefied matrices; Schemes of the Slane	Lections; Seminars; Independent work
4. to know the doctrine of matter, a modern scientific picture of the world, the doctrine of being, philosophical concept of space and time, relativistic model of reality	Lections; Seminars; Independent work
5. Know the content and problematic in the philosophical theory of knowledge, its main forms and strategies	Lections; Seminars; Independent work
6. Know the philosophical concepts of science and technology	Lections; Seminars; Independent work
7. Know the philosophical content of the problem of occurrence, nature and essence of consciousness	Lections; Seminars; Independent work
8. to know the foundations of philosophical anthropology	Lections; Seminars; Independent work
9. to know the structure of social systems, the doctrine of culture and the doctrine of values ??	Lections; Seminars; Independent work
10. Know the appropriate physico-mathematical apparatus, methods of analysis and modeling, theoretical and experimental research of processes and phenomena underlying the principles of electrical equipment and Systems	Lections; Seminars; Independent work
11. to know the content of historical progress and the philosophical interpretation of global human problems	Lections; Seminars; Independent work
12. to know the specifics of moral, moral and spiritual levels of human existence	Lections; Seminars; Independent work
To be able to: apply search, collection and information processing techniques; Creit analysis and synthesis of information obtained from different sources; Apply the system approach to solve the tasks set.	
13. knows the main, including the Communicative Features of Runet, significant Russian-speaking resources and their role in the communicative processes of Russia	Lections; Seminars; Independent work
14.. To be able to find information in Internet	Seminars; Independent work
own: search methods, collection and processing, critical analysis and information synthesis; method of a systematic approach to solving the tasks.	
15. To be able to apply modern methods of developing mathematical models of objects and processes	Seminars; Independent work
has practical experience in analyzing philosophical and historical facts, the experience of assessing cultural phenomena.	
16. To be able to perform a philosophical ethical analysis of the actions of a person and the behavior of society as a whole	Seminars; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 3				
Didactic unit: Streaming input-output in C ++				

1. Worldview as a subject of philosophy.		2	1, 13	levels of worldview. The content of worldview. Forms of worldview. The relationship of philosophy with mythology, religion, art and science.
2. The subject of philosophy.		2	2	Structure of philosophical knowledge. The main aspects of philosophical knowledge. The main methods of philosophy (metaphysical, dialectical, phenomenological, hermeneutic). Functions of philosophy
Didactic unit: Information aspects of systems study				
3. The origin of philosophical theoretical thought, its cultural and historical prerequisites.		1	1	axial time in K. Yaspersu. The ratio of the three main centers of civilization of the ancient world - Ancient Chinese, Ancient Indian and European. Formation of Eastern and Western philosophizing styles.
4. Eastern philosophy.		1	3	Major schools and directions of ancient Indian philosophy: Orthodox (Vedanta, Yoga, Nyaya, Wai-Sheshika, Santa, Mimans) and non-sour-cell (Jainism, Buddhism). Major schools and directions of ancient Chinese philosophy: Taoism, Confucianism, Moism, Legherness, School of Names.
5. Antique philosophy.		1	3	Prerequisites of philosophical knowledge in ancient Greece. Miletsky school. Eleate school. Heraklit. EmPedocl. Anaxagor. Pytagoreism. Antique atomism. Softers. Socrates. Plato. Aristotle. Kinism. Hellenistic period of antique philosophy: epicureism, stoicism, skepticism, neoplatonism.

6. Medieval philosophy.		1	3	Backgrounds of Christian worldview. Apologetics (TERTULLYAN), Patriote (Avrellius Augustine), Scholasty (Boeations, Albert Great). Classical medieval philosophy (Thomas Aquinas). Philosophical thought in Byzantium (John Damaskin). Mysticism (Bonaventure, Maister Eckhart). The main philosophical problems of medieval philosophy: the divine predestination and freedom of humans, the theotice, the ratio of the mind and faith, the interaction of the soul and body, the essence and existence, created and the eternal, the problem of evidence of the existence of God, the problem of universal (realism and nominalism). Soteriology
7. The philosophy of the Renaissance.		1	3	the basics of humanism (secularization of public consciousness, anthropocentrism, anti-Ossetism. Hedonism, pluralism, individualism). Religious and naturophilosophical pantheism (N. Kuzansky, D. Bruno). Background of scientific knowledge (L. Da Vinci, B. Telezio, N. Copernicus). Social philosophy (T. Ma, T. Kompanel). Political philosophy (N. Makiavelli). Reformation philosophy (M. Luther, J. Calvin).
8. The philosophy of the new time.		1	3	The scientific revolution of the 20th century and its influence on the features of the consideration of the main fi-losophical problems. Rationalism (R. Descart, B. Spinosa). Sensualism (D. Lokk, D. Yum). Empirism (F. Bacon). Idealism (Labitz, D. Berkeley). Formation of the scientific painting of the world (T. Brage, I. Kepler, Galilee, I. Newton, H. Guigens). Materialism (P. Golbach, J. Lameter, K. Gelving).

9. Philosophy of the era of classicism.		1	3	Transcendentalism I. Kant. Objective idealism and dialectical method of Gegel. Materialism L. Feyerbach. Marxism. Antiscentism (A. Shopenhauer, F. Nietzsche).
10. The main directions of modern philosophy.		1	3	The first positivism (O. Kont, D. Mill, Spencer). Natural scientific agnosticism (I. Muller, Gelmagolz, K. Pirizon). Empiricism (E. Makh, R. Avenairius). Conventmentalism (P. Dugen, A. Poankar). Nezozenism and analytical philosophy (B. Russell, L. Wittgenstein, Viennese circle). Existentialism (S. Kierkegore, K. Yaspers, J.-P. Sartre, A. Kama). Freuddism and Neofreedism (Z. Freud, K. Jung, E. Fromm). Phenomenology (F. Brentano, E. Gusserl). Hermenevics (G.-h. Gadamen, P. Riker). Postmodernism (J. Lacan, J. Derrida, M. Foucault).
11. Russian Philosophy.		1	3	Practical and artistic and figurative orientation of Russian philosophy. The emergence of Russian philosophy (M.V. Lomonosov, A.N. Radishchev). For example, in Russia (Russian idea, Westerners and Slavophiles, fuels, Eurasians). Russian religious philosophy (K.N. Leontiev, F.M. Dostoevsky, L.N. Tolstoy, V.S. Soloviev, N.A. Berdyaev, S.N. Bulgakov). Criticism of rationalism, sensualism and empiricism (L.M. Lopatin, S.N. Trubetskaya). The theory of unity (A.S. Khomyakov, S.N. Trubetskaya, S.L. Frank).
Didactic unit: Functional schemes of automatic control systems.				
12. Teaching about being.		2	4	Genesis, non-existence, invention. Objective and subjective being. The main modes of Genesis (real, virtual, mental, perfect). The doctrine of matter. Models of matter (substrate, substantial, attribute, relational, quantum). Concepts of space and time. The main problems of the philosophy of space and time.

13. Development Decision.		2	4	Determinism and intederism. Locality and nonlocality. Self-organization matter. Chaos and order. The second law of thermodynamics and the problem of the orderness of the universe. Synergetics and anti-satropine forces. Relativistic model of reality (V.V. Kryukov).
Didactic unit: Philosophy Cognition				
14. Cognition as a reflection of reality. Structure of truth (shape and content). Subjective aspects of truth (dispositional, motivational, sociocultural). Objective aspects of truth (existent, axiological, praxiological). Forms of knowledge (sensual and rational).		2	5	The subject and object of knowledge. Cognitive human abilities. Cognition and creativity. Understanding and explanation. Sensual and rational stages of knowledge. Gnoseological models (objectivist, subjectivist, dialectical, symbolic). Cognitive strategies (rationalism, empiricism, sensualism, irrationalism, intuivitism, panochism). Pessimistic doctrines of gnoseology (skepticism, agnosticism). Optimistic doctrines of gnoseology (immanestist, platonic, theological, transcendentalist, realistic, praxiological). Truth criteria (correspondent, coherent, pragmatic, conventional, authoritarian).
15. Scientific knowledge.		2	6	Levels of scientific knowledge (empirical and theoretical). Forms of scientific knowledge (fact, hypothesis, law, principle, theory). Empirical research methods. Theoretical research methods. Scientific knowledge concepts (K. Popper, I. Lakatos, T. Kun, P. Feyebend).
Didactic unit: Philms Consciousness				

16. Consciousness, its origin and essence.		2	7	Consciousness as a substance, attribute , Modeus. Properties of consciousness (ideality, subjectivity, intentionality, apoditicism). Consciousness and knowledge. Topographic structure of consciousness (conscious, preliminary, unconscious, superconscious). Intuition and imagination. Thinking, memory, will, emotions. Language and thinking. The problem of artificial intelligence. Consciousness, self-consciousness and personality. Freed out of the will of man. Consciousness and its importance for human practice.
17. Paradoxes of consciousness (paradox of evidence, paradox of gnoseological closetness, paradox of ontological crigngement, paradox of introspection, unpretentious paradox). Problems of consciousness (ontic, ontological, methodological, psychophysical, genetic).		2	7	Basic philosophical theories of consciousness: idealistic (D. Berkeley, G. Hegel), Dualistic (R. Descartes, N. Malbransh, A. Geylinx), Inactivityist (D. Eccles, K. Popper), modular (D. Fodor, S. Pinker, N. Khomsky), Functionalist (H. Patnham, D. Dennet), Naturalist (D. Serll), Materialist (D. Lewis, D. Armstrong), Epiphenomenist (D. Chalmers).
Didactic unit: human philosophy				
18. Objectivist (natural-objective, ideal-given, sociological) and subjectivist human concepts (psychoanalytic, existential, etc.).		0,5	8	The main philosophical concepts of the essence of human being (comoescentrism, logocentricism, theocentrism, anthropocentrism, naturocentrism, ontocentrism). Anthropogenesis Theories (Evolutionism, Creationism).
19. Natural (biological) and public (social) in person.		2	8	specificity of human activity. Man as a spiritual creature. Spirituality and confusion. Meaning of life. Fate and freedom. Social essence of man. Man, individual, personality, personality. Asymptotes of human existence. Socialization of the personality.
Didactic unit: Culture philosophy				
20. The concept of the social system.		1	9	Culture as the essence of society. Noosphere as a way of life of society. Civilization as a stage in the development of society.

21. values ??as elements of culture in the output file.		1,5	9	Values, their nature and principles of classification. Evolution of values ??(philosophical aspect). Value and goal. Value and truth. Value and evaluation. Value and norm. Morality and morality: general and special. Hierarchy of moral and moral values. Value characteristic of good and evil. The problem of forming or updating moral values. Ethical and aesthetic values.
Didactic unit: Social philosophy				
22. Definition and subject of social philosophy.		2	10	Types of society. Social structure of society. Political life of society. Economic life of society. Spiritual life of society. Society as a self-developing system. Civil society and state. Analytical and synthetic concepts of civilizations. Problems of crisis, decay, take-off and decline of civilizations.
23. Public consciousness.		2	11, 12	driving forces of public life. Objectives of social development. Logic history and its meaning. The concepts of progress and regression. The problem of typology of the historical process (O. Spengler, K. Marx, A. Tynby, M. Weber). Theory of Social Progress (D. Vico, J. Kondors, J.-zh. Rousseau). Man in the historical process.
Didactic unit: The physical level of the model OSI				
24. Modern generallylanet civilization, its features and contradictions.		2	11	Selecting parameters of regulators for DC and AC electric drives

Table 3.2

Themes	**Active forms, hours**	**Hours**	**Links to learning results**	**Learning activities**
Semester: 3				
Didactic unit: Streaming input-output in C ++				

1. Worldview as a subject of philosophy.	0,5	0,5	13, 14	Working at the seminar lesson, student: - gets acquainted with the versions of the worldview and their grounds, getting the opportunity to assess their own; - compares philosophy with mythology, religion, art and science; - realizes the basis of the excellent scientific knowledge system from unscientific.
2. The subject of philosophy and specificity of philosophical knowledge.	0,5	0,5	14, 15, 2	Working at the seminar lesson, student: - It is understood in the specifics of the subject area of ??philosophy; - meets the structure of philosophical knowledge and its main aspects; - learns to apply the main methods of philosophy; - studies the functions of philosophy.
Didactic unit: Information aspects of systems study				
3. The birth of philosophical thought, its cultural and historical prerequisites.		0,5	1	Working at the seminar lesson, student: - studies the background of philosophical knowledge; - gets acquainted with axial time according to K. Yaspers; - Compare Eastern and Western styles of philosophizing.
4. Eastern philosophy.		0,5	3	Working at the seminar lesson, student: - meets the main schools and directions of Eastern Philosophy; - compares the ancient Indian and Oldequime philosophy.
5. Antique philosophy. Background of philosophical knowledge in ancient Greece. Miletsky school. Eleate school. Heraklit. EmPedocl. Anaxagor. Pytagoreism. Antique atomism. Softers. Socrates. Plato. Aristotle. Kinism. Hellenistic period of antique philosophy: epicureism, stoicism, skepticism, neoplatonism.		0,5	3	Working at the seminar lesson, student: - studies the background of philosophical knowledge in ancient Greece; - analyzes the submissions of the main schools of antique philosophy.

6. Medieval philosophy.		0,5	3	Working at the seminar lesson, student: - studies the prerequisites of the Christian worldview; - analyzes the main philosophical problems of medieval philosophy.
7. The philosophy of the Renaissance.		0,5	3	Working at the seminar lesson, student: - studies the foundations of humanism of the Renaissance; - analyzes the prerequisites for scientific knowledge; - Exploring the features of the philosophy of the Renaissance.
8. The philosophy of the new time.		0,5	3	Working at the seminar lesson, student: - explores the premises of the scientific revolution of the 19th century and its influence on philosophical thinking; - analyzes the philosophical aspects of the formation of the scientific picture of the world; - studies materialistic trends in the philosophy of the new time; - Compare rationalism and empirism.
9. Philosophy of the era of classicism.		0,5	3	Working at the seminar lesson, student: - studies the transcendental philosophy of I. Kant; - learn to use the dialectical method of Gegel; - meets the antisciented philosophy of A. Shopenhauer and F. Nietzsche; - analyzes the main provisions of the materialistic philosophy of L. Feyerbach; - Explores the basics of Marxism.
10. The main directions of modern philosophy.		0,5	3	working at the seminar lesson, student: - analyzes such directions of modern philosophy as positivism, existentialism, neopreidism, phenomenology, hermeneutics, postmodernism; - Based on their comparison, it is studyable for a critical method.

11. Russian Philosophy.		0,5	3	Working at the seminar lesson, student: - studies the sock ideas of Russian philosophy; - considers the criticism of rationalism, sensualism and empiricism by Russian philosophers; - Analyzes the fundamental prerequisites of the theory of unity.
Didactic unit: Functional schemes of automatic control systems.				
12. Teaching about being.	0,5	1	15, 4	Working at the seminar lesson, student: - gets an idea of ??the content of the concept of "being"; - compares the content of the concepts of "Genesis" and "matter"; - studies philosophical ideas about matter; - analyzes the main problems of the philosophy of space and time.
13. Decision on development.	0,5	1	15, 4	Working at the seminar lesson, student: - compares the metaphysical and dialectical vision of the surrounding world; - explores the concept of determinism and industrialism; - explores the concepts of locality and nonlocality; - analyzes the philosophical problems associated with self-organization of matter.
Didactic unit: Philosophy Cognition				
14. Theory of knowledge.	1	1	14, 5	working at the seminar lesson, student: - reveals the structures and forms of the cognitive process; - explores the epistemological models and theoretical and cognitive strategies; - learns to distinguish the truth objective and subjective; - learns to use truth criteria; - explains the need for absolute and relative truth; - shows the possibility of logical evidence of truth.

15. Scientific knowledge.	1	1	15, 5, 6	Working at the seminar lesson, student: - learns to distinguish scientific knowledge from unscientific; - explore the levels and forms of scientific knowledge; - meets the basic methods of empirical and theoretical research; - Analyzes the main concepts of scientific knowledge.
Didactic unit: Philms Consciousness				
16. Consciousness, its origin and essence.	0,5	0,5	7	Working at the seminar lesson, student: - trying to understand what consciousness is; - explores the main properties of consciousness; - Finds grounds for an answer to the question of the mental possibilities of the car.
17. Theory of consciousness.	0,5	0,5	7	Working at the seminar lesson, student: - analyzes the main paradoxes and problems of philosophy of consciousness; - compares the main philosophical theories of consciousness.
Didactic unit: human philosophy				
18. Philosophical concept of man.	1	1	8	Working at the seminar lesson, student: - learns a philosophical understanding of a person based on the identification of specific signs of existence; - compares various philosophical concepts of man; - compares various anthropogenesis theories.
19. The essence of human being.	1	1	8	Working at the seminar lesson, student: - compares the projections of the human essence on various planes of being and study their integration into a single ontological whole; - analyzes the specificity of human activity; - reflects on the spiritual essence of man; - conducts a demarcation line between individuals, individual, personality and personality; - Explore the mechanisms of socialization of the personality.

Didactic unit: Culture philosophy				
20. Socio-cultural genesis of a person.	1	1	9	Working at the seminar lesson, student: - characterizes cultural factors of social life and human existence; - gets an idea of ??the content of the concept of "social system"; - considers culture as the essence of society; - considers the nosphere as a way of life of society; - Considers civilization as a stage in the development of society.
21. Doctrine of values.	1	1	16, 9	Working at the seminar lesson, student: - considers values ??as elements of culture; - studies the types of values ??and the principles of their hierarchical classification; - finds and interprets the value content of human being; - reflects on the nature of good and evil.
Didactic unit: Social philosophy				
22. Definition and subject of social philosophy.	1	1	10	Working at the seminar lesson, student: - considers various types of society and its social structure; - analyzes and compares various levels of public life; - explores society as a self-developing system; - finds approaches to solving basic problems in the development of civilizations.
23. Public consciousness.	1	1	11, 12	Working at the seminar lesson, student: - formulates the main signs of the forms of public consciousness and justifies their need for public life; - explore the driving forces of public life and the goal of social development; - explores the main trends and forms of the principal process; - allocates the main signs of the progress of public life; - Analyzes the main problems of social progress.
Didactic unit: The physical level of the model OSI				

24. The philosophy of global problems of humanity.	1	1,5	11, 16	Working at the seminar lesson, student: - reveals the features and contradictions modern generallylanetary civilization; - classifies and analyzes global problems of humanities; - reflects on the possible scenarios of the future in the framework of the generallylanetary civilization; - predicts the development of human civilization on the basis of certain mechanisms of the historical process and the specified signs of the modern public being of a person.

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Main literature

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Internet resources

1. Винникова О. А. История и философия науки (аспирантура) [Электронный ресурс] : электронный учебно-методический комплекс / О. А. Винникова, В. В. Крюков, И. В. Черепанов ; Новосиб. гос. техн. ун-т. - Новосибирск, 2015. - Режим доступа: http://dispace.edu.nstu.ru/didesk/course/show/4946. - Загл. с экрана.

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Methodical support and software

Methodological support

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2. Сандакова Л. Б. Философия науки [Электронный ресурс] : электронный учебно-методический комплекс / Л. Б. Сандакова ; Новосиб. гос. техн. ун-т. - Новосибирск, [2021]. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000243409. - Загл. с экрана.

Specialized software

1 Calculator of the cost and timing of the project and its stages according to the COCOMO COCOMO® II.2000.4 methodology

2 Microsoft Office Application Pack

ANNOTATION OF THE PROGRAM
Network information technologies

Course: 1, semester ы : 1 2

		Semester	
№	**Kind of activity**	**1**	**2**
1	Total credits	7	6
2	Total hours	252	216
3	Total classes in the contact form, hours	167	164
4	Lectures, hours	72	72
5	Practical lessons, hours	72	72
6	Laboratory studies, hours	0	0
7	of them in an active and interactive form, hours	10	8
8	Consultations, hours	21	18
9	Independent work, hours	85	52

External requirements

can apply natural science and general knowledge, methods of mathematical analysis and modeling, theoretical and experimental study in professional activities; *regarding the following learning results*:
To be able to compare the results of experimental data and the solutions received
to know: the foundations of mathematics, physics, computational t Equipment and programming.

Requirements for the results of mastering the discipline

The results of the study of the discipline	**Forms of organizing classes**
to know: the foundations of mathematics, physics, computational t Equipment and programming.	
1. about mathematics as a special way of knowledge of the world, the generality of its concepts and ideas;	Lections; Seminars; Independent work
2. The main concepts of the highest mathematics course: the sequence and function limit, derivative and private derivatives, differential, the integral of the Riemann from the function of one variable, incomprehensible integrals and multiple integrals, an ordinary differential equation, a numerical row, power row, Fourier series, Fourier integral	Lections; Seminars; Independent work
3. The formulation and methods of solving the main tasks associated with the concepts listed above	Lections; Independent work
To be able to compare the results of experimental data and the solutions received	
4. choose methods for solving problems based on the analysis of the constructed mathematical model.	Lections; Seminars; Independent work

5. UK-1. 2 2. To be able to: apply search techniques, collection and processing information; Creit analysis and synthesis of information obtained from different sources; Apply a system approach to solve the tasks.	Lections; Seminars; Independent work
6. Find general solutions and solutions to Cauchy problems for the basic classes of ordinary differential equations of the first and higher orders, solve the simplest systems of ordinary differential equations;	Seminars; Independent work
7. Translate information from the language of a specific task into the language of mathematical symbols and build mathematical models of simplest systems and processes in natural science and technique;	Lections; Seminars; Independent work
8. differentiate the functions of one variable specified explicitly, parametrically and implicitly; carry out their full study using differential calculus methods; differentiate the functions of many variables;	Lections; Seminars; Independent work
9. calculate double, triple and curvilinear integrals and use them when solving the tasks of geometry and physics;	Seminars; Independent work
10.	Seminars; Independent work
11. to determine the convergence of numerical and functional rows, represent Functions in the form of Taylor and Fourier series and in the form of the Fourier integral;	Seminars; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 1				
Didactic unit: Elements of modern physics				
1. 2. Elements and nodes with memory.		14	1, 2, 3, 5	Work with abstract
Didactic unit: Diagnostic Opportunities PC				

2. 2.1. Derived function, its geometrical meaning. Derivative sum, works, private functions. 2.2. Derivative complex function. Derived reverse function. Derivatives inverse trigonometric functions. The derivative of the function specified parametrically implicitly. 2.3. Differential function. The connection of the differential and derivative function. Geometric meaning of differential. Derivatives of higher orders. 2.4. Theorems Farm, Roll. Taylor formula. Lopital rule. 2.5. Conditions of increasing and descending function. Extremum points. Required and sufficient conditions of extremum. Introducing the smallest and greatest value of functions continuous on the segment. 2.6. Study of functions for bulge and concaveness. Points of inflection. Asymptotes of curves. General scheme IC- Functions and constructing function graphics.		18	1, 2, 3	Work with abstract
Didactic unit: Integral calculus of functions of one valid variable				

3. 3.1. The concept of a primitive function, its properties. Uncertain integral, its properties. The main table of uncertain integrals. The main integration methods (summarizing the differential sign, integrating in parts, replacement of the variable). 3.2. Theorem on the decomposition of rational fraction on the sum of the simplest. Integrating rational functions. 3.3. A certain integral as a limit of integrated amounts. The main properties of a specific integral. Middle theorem. 3.4. A certain integral with a variable upper limit and its properties. Formula Newton Labitsa. 3.5. Basic methods for calculating certain integrals. 3.6. Incomplete integrals with infinite limits. Invalous integrals from unlimited functions. 3.7. The application of a certain integral to the objectives of the geo metry: calculating the areas of flat figures, the length of the arc curve, the volume of the bodies according to their cross section and the volume of the bodies of rotation.		24	1, 2, 3	Work with abstract
Didactic unit: Differential calculus of the functions of several valid variables				
4. 4.1. The concept of the function of many variables. Definition area, limit and continuity. 4.2. Private derivatives. Full differential and its connection with private derivatives. Tangent plane and normal surface. 4.3. Extremes function 2 variables. Required and sufficient conditions. The greatest and smallest values ??of the function on a closed area. 4.4. Vector Analysis Elements: The derivative of the scalar field in the direction. Gradient.		16	2, 3, 4, 8	Work with abstract
Semester: 2				
Didactic unit: integral calculus of functions of several valid variables				

5. 5.1. Definitions of double and triple integrals, their main properties. 5.2. Configuration of the re-integral. Calculating double and triple integrals in Cartesian coordinates. 5.3. The concept of the curvilinear coordinate system. Polar, cylindrical and spherical coordinate systems. Replacing variables in multiple integrals. 5.4. The curvilinear integrals of the first and second kind, their main properties, calculation. Physical applications. 5.5. Green formula. The conditions for the independence of the curvilinear integral of the second kind from the path of integration.		20	1, 2, 3, 4, 7	Work with abstract
Didactic unit: Differential equations				

6. 6.1. Physical objectives leading to differential equations. Differential equations of first order, basic concepts. Common decision. Cauchy task. The theorem of the existence and uniqueness of the solution of the Cauchy problem. The main classes of equations integrated in quadratures (with separating variables, homogeneous, linear, Bernoulli, in full differentials). 6.2. Differential equations of higher orders. Cauchy task. Equations that reduce the order. 6.3. Linear differential equations, homogeneous and inhomogeneous. The structure of the overall solution. Linear differential equations with constant coefficients. 6.4. Method of variation of arbitrary constants. Equations with the right side of a special type. 6.5. The concept of a system of ordinary differential equations. Normal form. The structure of the overall solution. 5.6. Normal system of linear differential equations with constant coefficients. The solution in the case of simple valid roots of the characteristic equation.		26	1, 2, 3	Work with abstract
Didactic unit: Rows and elements of harmonic analysis				

7. 7.1. Numeric rows. Convergence and sum of the row. Required convergence condition. Actions with rows. Sufficient signs of convergence of aligning rows. 7.2. Signaged rows. Absolute and conditional convergence. Aligning rows. Sign of Leibnia. 7.3. Functional series, region of convergence of the functional series. The concept of uniform convergence. 7.4. Power rows. Abel theorem. Radius of convergence. Properties of power rows. A number of Taylor. Decomposition of the function in power rows. 7.5. Fourier rows. Trigonometric Fourier row. Integral Fourier. 6.5 orthogonal systems of functions. Fourier row. Fourier coefficients. 6.6. Decomposition in trigonometric Fourier series of functions specified on the interval. Formulation of the conditions for decomposability of functions in a row of Fourier. Decomposition in a Fourier series of even and odd functions. Decomposition in a series of Fourier functions on cosines or sinuses specified on. 6.7. Fourier series in comprehensive form. 6.8. Fourier integral in real and comprehensive form.		26	1, 2, 3	Work with abstract

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 1				
Didactic unit: Elements of modern physics				
1. 1.1. Elementary functions, properties, graphics. 1.2. Graphs of functions specified parametrically and in the polar coordinate system. 1.3. Sequence limit. 1.4. Limit function at point and infinity. Algebraic limit properties. 1.5. The first and second wonderful limits. 1.6. Continuity function. Grocery points and their classification.	2	16	2, 5	Allocate the main elementary functions whose graphs are used for transformations; Build lines given by parametric method and in the polar coordinate system; find out the nature of uncertainty when calculating the limit; Choose a way to disclose uncertainty; investigate continuity functions; Classify the gaps.

Didactic unit: Diagnostic Opportunities PC				
2. 2.1. Derivative function at point. Geometric meaning. 2.2. Derivative complex function. Derived reverse function. The derivative of the function specified parametrically implicitly. 2.3. Lopital rule. 2.4. Monotonicity of the function, extremum function. Required and sufficient conditions of monotony and extremum function. The greatest and smallest values ??of the function on the segment. 2.5. Conversion and concavity function graphics. Points of inflection. Required and sufficient inflection conditions. Asymptotes of curves. 2.6. General Research Scheme Function and Graphic Construction.	2	20	5, 8	Select differentiation techniques depending on the method of setting the function; Improve the technique of differentiation of complex functions; Apply the concept of the derivative in solving problems with geometric content; Analyze the possibility of applying the Lopital rule when calculating the limits; investigate the functions of differential calculus methods; Check the awareness of the research results and their graphical representation.
Didactic unit: Integral calculus of functions of one valid variable				
3. 3.1. Perfect. Uncertain integral and its properties. 3.2. Table of basic integration formulas. Integrating a summing up of differential, in parts and replacement of the variable. 3.3. Integrating rational functions. 3.4. Integrating trigonometric functions and some irrationalities. 3.5. Certain integral and its calculation. 3.6. Applications of a specific integral to calculate the areas of flat figures, arc lengths, bodies of rotation. 3.7. Invalid integrals. 3.6. Invalid integrals. 3.7. Geometric applications of a specific integral.	4	20	10, 5, 7	Molds the simplest integration techniques; checks the result of integration by differentiation; chooses and justifies methods for integrating functions of various types; Selects the coordinate system and the necessary formula when calculating the areas of figures, arc lengths, the volume of rotation bodies. applies a specific integral when solving tasks with geometric content; classifies immunity integrals; Investigate incompatible integrals for convergence.
Didactic unit: Differential calculus of the functions of several valid variables				

4. 4.1. The field of determining the function of many variables; 4.2. Private derivatives and differential functions of many variables; 4.3. Tangent plane and normal surface. 4.4. Extremes function of two variables. Study of the function to the largest and smallest values ??in a closed area. 4.5. The derivative of the scalar field in the direction. Gradient.	2	16	5, 8	Compare the concepts of the definition area and derivative for functions of one and two variables; Collect the technique of differentiation of functions of many variables; investigate the functions of two variables to the extremum, the greatest and smallest values ??in the closed area; Calculate the rate of change of the scalar field in a specified direction, determine the direction of the greatest change.
Semester: 2				
Didactic unit: integral calculus of functions of several valid variables				
5. 5.1. Change in the order of integration in the repeated integral; 5.2 .. Calculation of dual and triple integrals in rectangular coordinates; 5.3. Replacing variables in multiple integrals. Double integral in polar coordinates. Triple integral in cylindrical coordinates; 5.4. Calculation of body volume with multiple integrals. 5.5. Calculation of curvilinear integrals of the first kind and second kind 4.9. Calculation of curvilinear integrals of the second kind. Green formula. Terms of independence integral from the path of integration. Calculating the potential of the vector field; 4.10. Applications of curvilinear integrals.	2	24	9	Select the coordinate system for the rational calculation of the integrals; Multiple integrals use when solving tasks with geometric content. compare the curvilinear integrals of the first and second kind and apply the necessary integral when solving a specific task; Use curvilinear integrals when solving some physical problems.
Didactic unit: Differential equations				

6. 6.1. Differential equations of the first order. Common decision. Cauchy task. 6.2. Differential equations of higher orders. Common decision. Cauchy task. Equations that reduce the order. 6.3. Linear differential equations with constant coefficients. 6.4. Linear inhomogeneous differential equations. Method of variation of permanent. 6.5. Linear inhomogeneous differential equations with the right side of a special type. 6.6. Systems of differential equations. Exception method. 5.7. Systems of linear differential equations with constant coefficients. The solution in the case of simple roots of the characteristic equation.	4	28	4, 6, 7	determine the type of differential equations; Select the appropriate decision methods; constitute an algorithm for solving linear inhomogeneous equations with the right-hand side of a special type; Differential equations are used in solving problems with physical and geometric content.
Didactic unit: Rows and elements of harmonic analysis				
7. 7.1. Numeric rows. Required convergence condition. Sufficient signs of convergence of aligning rows. 7.2. Signaged rows. Absolute and conditional convergence. Aligning rows. Sign of Leibnia. 7.3. The region of the convergence of the functional series. 7.4. Power rows. Radius of convergence. A number of Taylor. Decomposition of the function in power rows. 7.5. Fourier series on trigonometric function system. Dirichlet condition. Fourier series for even and odd functions. 7.6. Fourier series in comprehensive form. 6.7. Integral Fourier.	2	20	1, 11	select a sign for a rational study of numerical rows into convergence; find the region of convergence of functional series; represent functions in the form of power series, perform approximate calculations, evaluate the error; Represent functions in the form of a row of Fourier in a valid and complex form, as well as in the form of the Fourier integral.

Literary sources

Main literature

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Methodical support and software

Methodological support

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Specialized software

1 Microsoft Office Application Pack

2 Calculator of the cost and timing of the project and its stages according to the COCOMO COCOMO® II.2000.4 methodology

ANNOTATION OF THE PROGRAM
Physics

Course: 1 2, semester ы : 2 3

		Semester	
№	**Kind of activity**	**2**	**3**
1	Total credits	5	3
2	Total hours	180	108
3	Total classes in the contact form, hours	122	76
4	Lectures, hours	54	36
5	Practical lessons, hours	44	18
6	Laboratory studies, hours	18	18
7	of them in an active and interactive form, hours	0	0
8	Consultations, hours	4	2
9	Independent work, hours	58	32

External requirements

can apply natural science and general knowledge, methods of mathematical analysis and modeling, theoretical and experimental study in professional activities; *regarding the following learning results*:
To be able to compare the results of experimental data and the solutions received
to know: the foundations of mathematics, physics, computational t Equipment and programming.

Requirements for the results of mastering the discipline

The results of the study of the discipline	**Forms of organizing classes**
to know: the foundations of mathematics, physics, computational t Equipment and programming.	
1. Know the basic laws of physics, which are basic to solve the tasks of professional activity	Lections; Seminars; Laboratory works; Independent work
2.The basic knowledge of the fundamental sections of physics in the amount required to master the physical foundations in the field of professional activities	Lections; Seminars; Laboratory works
3. Basic laws of physics, which are basic to solve problems of professional activities	Seminars
To be able to compare the results of experimental data and the solutions received	
4. Choose the simplest models of physical objects and processes	Lections; Seminars; Laboratory works; Independent work
5. Apply the main methods of physical research of phenomena and properties of the material world objects	Lections; Seminars
6. Apply a statistical approach to research and decision Tasks	Lections; Seminars; Laboratory works

7. Apply the main methods of physical research of phenomena and properties of the material world objects	Lections; Seminars; Laboratory works
8. The nature of the occurrence of Esnarities When applying mathematical models and the need to evaluate the error	Lections; Seminars; Laboratory works
9. Plan and organize simple experiments, process and analyze the results obtained	Lections; Seminars; Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 2				
Didactic unit: mechanics				
1. Kinematics of the material point, medium and instantaneous speed, Galilee transform. Acceleration. Vector, coordinate and "natural" ways to describe traffic.		2	2, 5	listens to the lecture, analyzes, writes a significant
2. Weight. Force. Newton's laws. Pulse particles. Pulse particle system. The main equation of speakers. The law of preserving the impulse. Mass center particle system. The law of movement of the center of mass. System of the center of inertia.		2	2, 4, 5, 7, 8	listens to the lecture, analyzes, writes a significant
3. Work and power. Potential forces. Kinetic energy and potential energy. The law of preserving the full mechanical energy of the system. Absolutely elastic and absolutely inelastic strikes.		2	2, 7, 8	listens to the lecture, analyzes, writes a significant
4. Kinematics of rotational motion. Vectors of angular, linear speed and acceleration. The moment of the inertia of the solid body. Steiner Theorem		2	2, 4	listens to the lecture, analyzes, writes a significant
5. Dynamics of rotational motion. The moment of forces, the equation of the dynamics of the rotational motion. The moment of the particle pulse and particle systems. The law of preservation of the moment of impulse. The energy of the rotational motion.		2	1, 2	listens to the lecture, analyzes, writes a significant
6. Neinercial reference systems. Inertia forces. Power of the Caryolis. Mechanics of variable mass. Reactive power.		2	1, 2	listens to the lecture, analyzes, writes a significant
Didactic unit: Basics of relativistic mechanics				
7. Basics of relativistic mechanics		2	1, 2	listens to the lecture, analyzes, writes a significant

Didactic unit: Molecular (statistical) physics and thermodynamics				
8. Macroscopic system. Micro and macroscopic system parameters; Statistical and thermodynamic methods for describing the properties of the macro system. States and processes. Kinetic theory of ideal gases. Pressure and temperature of the ideal gas. The main equation of molecular-kinetic gases theory. Experienced laws of perfect gas.		2	4, 6	listens to the lecture, analyzes, writes a significant
10. The number of degrees of freedom of the molecule. Energy distribution in degrees of freedom. Internal gas energy of polyhydric molecules.		2	2, 4, 6	listens to the lecture, analyzes, writes a significant
11. The first beginning of thermodynamics. Gas operation when changing its volume. Heat. Heat capacity. Isoprocesses at first start of thermodynamics. Adiabatic process. Equations adiabat. Cycles. Reversible and irreversible processes. The concept of entropy. The law of increasing entropy. The second beginning of thermodynamics. Third principle of thermodynamics. Heat engines and refrigeration machines. Efficiency. Carno cycle.		2	2, 4, 6, 7	listens to the lecture, analyzes, writes a significant
13. Maxwell distribution for molecules. The range of molecules, the average and the most likely molecules speed. Boltzmann distribution. Barometric formula		2	2, 4	listens to the lecture, analyzes, writes a significant
14. kinematic analysis of mechanisms		2	2, 4	listens to the lecture, analyzes, writes a significant
Didactic unit: Electrostatics and permanent current				
15. Electrostatics. The law of the coulon. Electric field strength. Field of point charge. Principle of superposition of fields. Electrical field of dipole.		2	2, 4, 9	listens to the lecture, analyzes, writes a significant
16. vector stream. Gauss theorem in integral and differential forms. Examples of calculating field strengths using the Gauss Theorem.		2	2, 4, 7	listens to the lecture, analyzes, writes a significant
17. Work on the movement of charge in the field. Potentialness of the electrostatic field. Tension vector circulation theorem. Electric field potential, potential difference, equipotential surfaces. Tensions as a gradient of potential.		2	2, 4	listens to the lecture, analyzes, writes a significant

18. Dielectrics in the electric field. Polarization of dielectrics. The behavior of the dipole in the external electric field. Vector polarization. Vector electrical displacement. Gaussian theorem for an electrical displacement vector.		2	2, 4	listens to the lecture, analyzes, writes a significant
19. Conductors in the electrostatic field. Surface charges. Electrical field in the volume of the conductor. Electrical field at the surface of the conductor. Capacity coefficients and mutual capacity conductors. Capacitors. Capacitance capacitor. Energy interaction of electrical charges. Energy charged condenser. The energy density of the electrostatic field		2	4, 8	listens to the lecture, analyzes, writes a significant
20. Permanent electric current. Power and current density. Ohm law in integral and differential form. Work and current power. Law of Joule - Lenza. Third-party. EMF. Ohm law for an inhomogeneous section of the chain. Voltage and potential difference. Kirchhoff rules		2	2, 7	listens to the lecture, analyzes, writes a significant
21. Classical conductivity theory. Neomic conductors. The concept of a voltamper characteristic. Superconductivity.		2	2, 6	listens to the lecture, analyzes, writes a significant
Didactic unit: Electrodynamic and thermal resistance of the apparatus				
30. Electrical oscillatory processes. Characteristics of oscillations. Oscillatory contour. Energy conversion. Flowing oscillations. Quality.		2	2, 5	listens to the lecture, analyzes, writes a significant
31. Forced electrical oscillations. Alternating current. Method of vector diagrams. Resonance of currents, stress resonance.		2	2, 5	listens to the lecture, analyzes, writes a significant
Didactic unit: Energy saving in thermal energy transport and distribution systems,				
23. Vector magnetic induction. Magnetic field of moving charge and conductor with current. Formula Bio-Savara Laplas. Calculation of fields created by straight and circular conductors with current.		2	2, 5	listens to the lecture, analyzes, writes a significant
24. The theorem on the circulation of the magnetic induction vector. Calculation of fields inside solenoid and toroid. Distribution of the magnetic field in cross section of a round wire with a current.		2	2, 5	listens to the lecture, analyzes, writes a significant

25. The interaction of parallel conductors with a current. The power of the amp. Lorentz power. Magnetic moment circuit with current. A mechanical torque acting on the outline with a current in a uniform magnetic field. Magnetic stream. Gauss theorem for magnetic field. Work on the movement of conductors with a current in a magnetic field.		2	2, 5, 7	listens to the lecture, analyzes, writes a significant
26. Magnetic moment atom. Magnetic field in a substance-ve. Larmor frequency. Magnetic permeability conditions for the field at the edge of the section of two magnets of paramagnetics, diamagnet-ticks and ferromagnetics. Hysteresis in ferromagne ticks.		2	2, 5	listens to the lecture, analyzes, writes a significant
27. Phenomenon of electromagnetic induction. Inductance. Self-induction. Magnetic field energy.		2	2, 5	listens to the lecture, analyzes, writes a significant
28. The phenomenon of self-induction. Inductance of the conductor and solenoid. Transient processes when turning on and off the current in the electrical circuit. Relaxation time. Mutual induction. Transformer. The energy of the magnetic field.		2	2, 5	listens to the lecture, analyzes, writes a significant
29. Maxwell equations system for an electromagnetic field in integral and differential form. The concept of a shift current. Quasistazonar approximation. Methods for solving Maxwell equations. Electromagnetic potentials.			1, 2	listens to the lecture, analyzes, writes a significant
Semester: 3				
Didactic unit: Waves				
32. Wave processes. One-dimensional wave equation and its solution. Wave number. Flowing waves. The rise of the amplitude of waves in active media. Wave packets. Phase and group velocity.		4	2	listens to the lecture, analyzes, writes a significant
33. Acoustics. Acoustic waves in gaseous, liquid and solid media. Sound speed. Flowing elastic waves. Sound intensity, decibel. Frequency spectrum of the beep. Ultrasound, infrasound.		4	2, 5	listens to the lecture, analyzes, writes a significant

34. Electromagnetic waves, their main properties. Energy flow, Pinging vector. Transmission of electricity along conductors with current. Empty of electromagnetic waves. Dipole radiation. Middle, intermediate and distant radiation zones. Reception of waves. Antennas.		2	2, 5	listens to the lecture, analyzes, writes a significant
Didactic unit: Wave optics				
35. Geometric and wave optics. Wave interference. The concept of coherence. Calculation of the interference pattern from two coherent sources. Optical path length. Interference of light in thin films.		2	2, 5	listens to the lecture, analyzes, writes a significant
36. Guygens-Fresnel principle. Fresnel zone method. Freshel diffraction on a circular hole and disk. Fraunhing diffraction diffraction on the slit and diffraction lattice.		2	2, 5	listens to the lecture, analyzes, writes a significant
37. Polarization of light. Laws of Brewster and Malyus. Dispersion of light. Fiber optics.		2	2, 5	listens to the lecture, analyzes, writes a significant
Didactic unit: Channel level				
38. The laws of thermal radiation. The laws of Stephen Boltzmann, wines. Planck theory. Compton effect, photoeep.		4	2, 5	listens to the lecture, analyzes, writes a significant
Didactic unit: Quantum physics and physics atom				
39. de Broglie waves. Corpuscular wave dualism. The ratio of uncertainty. Schrodinger equation. Wave function and its meaning. Energy spectrum. The simplest quantum-mechanical tasks.		4	2, 5	listens to the lecture, analyzes, writes a significant
40. Quantum theory of atom. Periodic table. Spectra of molecules and crystals. Nanoelectronics.		4	2, 5	listens to the lecture, analyzes, writes a significant
41. Modern physical principles of primary converters in automation and measuring equipment		4	1, 2	listens to the lecture, analyzes, writes a significant
Didactic unit: Elements of the theory of functions and functional analysis				
42. Elements of nuclear physics and physics of elementary particles.		4	2, 5	listens to the lecture, analyzes, writes a significant

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 2				
Didactic unit: mechanics				

1. Measurement of the initial velocity of the bullet using a ballistic pendulum.		6	1, 4, 9	Uses the laws of energy and impulse to explain the results obtained. It receives an estimate of the error of the measured value and uses it when constructing the schedule.
2. Determining the moment of inertia of the obourbek pendulum		4	1, 4	determines the moment of inertia of the pendulum of the wubber for three provisions Georgs relative to the axis of the pendulum
Didactic unit: Electrostatics and permanent current				
3. Study of the power supply		4	1, 8, 9	Explores the dependence of the useful power and power loss of loss resistance and internal resistance of the source.
Didactic unit: Energy saving in thermal energy transport and distribution systems,				
4. Study of the properties of ferromagnetics		4	1, 4, 6, 7	determines the specific electron charge by the method of numerical modeling of the electron motion in the electric and magnetic fields of magnetron
Semester: 3				
Didactic unit: Electrodynamic and thermal resistance of the apparatus				
5. Own electromagnetic oscillations.		6	1, 2, 9	Examines curvilinear movement, normal and tangential acceleration.
Didactic unit: Wave optics				
6. Diffraction of light.		4	1, 9	According to the interference pattern, determines the distance between the slits serving sources of coherent light.
8. Polarization World		4	1, 4	Measicing the degree of polarization of laser radiation
Didactic unit: Quantum physics and physics atom				
7. Diffraction of microparticles.		4	1	The method of numerical simulation of microparticles diffraction on the hole determines the type of particles under study.

Table 3.3

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 2				
Didactic unit: mechanics				
1. Kinematics. Dynamics.		2	1, 2, 3, 4, 5, 7, 8	Uses the vector form of displacement, speed, acceleration. Selects the calculation method. If possible, calculates various coordinate systems.

2. The law of preserving momentum and energy. Elastic and inelastic blow.		4	1, 2, 3, 4, 5, 7	Solves the task in the laboratory reference system (LSO) and in the system of the inertia center (SCI). Analyzes the capabilities of these approaches, compares them.
3. Kinematics and the dynamics of the rotational movement. The law of preserving the moment of impulse.		2	1, 2, 4, 7	Calculates the moments of the inertia of the simplest solids. Uses the moments equation. Applies the law of preserving the moment of the pulse.
4. inertia forces. Coriolis strength. Movement of the mass of variable mass, reactive force.		2	1, 4, 7, 8	solves problems in non-intersocial reference systems and for variable mass systems
Didactic unit: Molecular (statistical) physics and thermodynamics				
5. Equation of the state of the ideal gas.		2	2, 4, 7, 8	Builds the graphs of isoproces in various axes. It applies the equations of the state of the ideal gas to calculate the functions of the state of the ideal gas
6. Energy distribution in the degrees of freedom. Heat capacity.		2	1, 2, 4	applies the law of uniform distribution of energy in the degrees of freedom. Calculates various types of heatabilities.
7. distribution of Maxwell, Boltzmann. Transfer Phenomena.		2	1, 6, 7	Calculates the probability of molecules in the intervals, average values ??
8. First the beginning of thermodynamics. Entropy. Cycles. Cool cycle.		2	1, 6, 7	applies the first beginning of thermodynamics to isoprocesses. This uses the adiabat equation.
31. entropy. Cycles. Carno cycle.		2	2	Applies the first top of the thermodynamics to isoprocesses.
32. Forced oscillations. Addition of oscillations			1	
Didactic unit: Electrostatics and permanent current				
10. The law of Coulomb. Electric field strength. The principle of superposition. Gaussian theorem.		2	1, 4, 7	Mastering the main representations of electrostatics, calculates field strengths, applies the principle of superposition. Applies Gauss theorem to calculate the strength and potential of the electric field. .

11. Conductor electrical capacity. Capacitors. Dielectrics in the electric field.		2	1, 2, 5	calculates the potentials of electric fields, uses the link between the tension and the electric field potential. Considers the behavior of the conductors in the electric field, calculates electrical capacity. Calculate the energy of the electric field. Applies Gauss theorem for an electric displacement vector, calculates polarization and electric field strength in dielectrics. Considers the conditions on the border of two dielectrics.
12. Permanent electric current.		2	1, 2, 4, 5, 7, 9	Uses the ratios between the charge, current force and current density, applies the laws of Oma and Kirchhoff.
Didactic unit: Mechanical oscillations				
13. Model of the harmonic oscillator. Differential equation of a harmonic oscillator.		2	1, 5, 7	applies a single energy approach to the description of the oscillations of ideal systems of various physical nature. Makes the differential oscillation equation. Assesses in each case the case of the applicability of the model of the harmonic oscillator.
14. Flowing oscillations. Forced oscillations. Addition of oscillations		2	1, 2, 7	describes the fluctuations in the simplest physical systems, taking into account the friction forces and resistance. Calculates the main characteristics of sputtering oscillations: attenuation coefficient, logarithmic decrement, Quality.
Didactic unit: Electrodynamic and thermal resistance of the apparatus				
20. Electrical oscillatory processes. Characteristics of oscillations. Oscillatory contour. Energy conversion. Flowing oscillations. Quality.		2	1, 4, 7	Calculates the parameters of the oscillating circuit.
21. Forced electrical oscillations. Alternating current. Method of vector diagrams. Resonance of currents, stress resonance.		2	1, 4, 7	calculates resonant characteristics.
Didactic unit: Energy saving in thermal energy transport and distribution systems,				

16. Movement of charged particles in electromagnetic fields. Calculation of magnetic fields according to the biofilament formula.		2	1, 2, 4, 7	Applies the basic law of the dynamics to describe the movement of the charged particle in the electric and magnetic field under the action of the force of Lorentz. Get acquainted with examples of practical application phenomena. It highlights simple (straight and circular) items in the conscripts of a complex configuration. Applies the formula of bio-savara lamps and the principle of superposition.
17. Calculation of magnetic fields by vector circulation theorem magnetic induction. Conductors with a current in a magnetic field.		2	1, 2, 4, 7, 8	Compares the methods for calculating magnetostatic fields. Selects the calculation method in a specific task. For symmetric current distributions, applies the theorem on the circulation of the magnetic induction vector. Justles theoretically behavior of conductors with a current in ampere experience. Calculates the strength and moments of forces acting on conductors with current.
18. Magnetic moment. Magnetic moment in a magnetic field. Magnetic field in substance.		2	1, 2, 5, 6	Explore the magnetic properties of the atom and its behavior in the external magnetic field calculates the field in the magnets and on the interface border Two Magnets.
19. Language and speech (statement). Language as a system of signs and a means of human communication (verbal and non-verbal means). Speech as a method for forming and formulating thought through a language in the process of speech activity. Oral and written form of speech, their interaction.		4	1, 2, 5	compares the potential and vortex electrostatic fields. Applies Faraday law and Lenza rule to solve problems Calculates the inductance of conductors. Receives the law of changing the strength of the current in the moments of turning on and off the electrical circuit. Calculates the energy of the simplest current systems.
Semester: 3				
Didactic unit: Waves				
22. Wave processes.		2	1, 4, 7	Calculates the parameters of the wave processes.
23. Acoustics. Sound speed. Sound intensity, decibel. Frequency spectrum of the beep.		2	1, 4, 7	Investigation of energy circulation in motor-generator direct current installations.
24. Electromagnetic waves		2	1	Explore the main properties of electromagnetic waves.
Didactic unit: Wave optics				

25. Light interference.		2	1, 4, 7	Calculates interference patterns in thin films and various interferometers. Calculates the intensity of light and the position of interference highs and minima.
26. Diffraction of light.		2	1, 4, 7	Applies Fresnel zone method for analyzing Fresnel diffraction phenomena for calculating diffraction on a circular hole and disk. Calculates diffraction patterns during diffraction on the slit and the diffraction grating.
Didactic unit: Channel level				
27. The laws of thermal radiation. Planck theory. Compton effect.		2	1, 4, 7	calculates the emission of absolutely black bodies and bodies with a real radiative ability. Displays the laws of thermal radiation from the formula of the plank. Calculates various parameters of the effect of componton.
Didactic unit: Quantum physics and physics atom				
28. De Brogly waves, the ratio of uncertainties. Solving the Schrodinger equation for various quantum systems.		2	1, 4, 7	Aware of the physical essence of the de Broglie waves and uses the ratio of uncertainties to assess the parameters of real physical processes. Calculates the form of a wave function for particles occupying various energy levels in an infinitely deep potential pit. Massages the concept of a probability density function, meets the concept of tunneling, reflection and passing through the barrier
29. Physical principles of primary transducers in automation and measuring equipment.		2		Analyzes the physical principles of creating primary converters in automation and measuring equipment.
Didactic unit: Elements of the theory of functions and functional analysis				
30. Nuclear reactions. Radioactivity		2	1, 4, 7	Calculates the energy yield of nuclear reactions, studies the laws of radioactive decay.

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Methodological support

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Specialized software

1 Calculator of the cost and timing of the project and its stages according to the COCOMO COCOMO® II.2000.4 methodology

2 Microsoft Office Application Pack

ANNOTATION OF THE PROGRAM
Linear Algebra

Course: 1, semester : 1

		Semester
№	**Kind of activity**	**1**
1	Total credits	4
2	Total hours	144
3	Total classes in the contact form, hours	86
4	Lectures, hours	36
5	Practical lessons, hours	36
6	Laboratory studies, hours	0
7	of them in an active and interactive form, hours	18
8	Consultations, hours	12
9	Independent work, hours	58

External requirements

can apply natural science and general knowledge, methods of mathematical analysis and modeling, theoretical and experimental study in professional activities; *regarding the following learning results*:
To be able to compare the results of experimental data and the solutions received
to know: the foundations of mathematics, physics, computational t Equipment and programming.

Requirements for the results of mastering the discipline

The results of the study of the discipline	**Forms of organizing classes**
to know: the foundations of mathematics, physics, computational t Equipment and programming.	
1.The main concepts of the highest mathematics course: coordinate systems, defo-dividers, vector algebra, equations of linear geometric objects, curves and surfaces of the second order;	Lections; Seminars; Independent work
To be able to compare the results of experimental data and the solutions received	
2. Calculate scalar, vector and mixed works for finding angles between vectors, squares, volumes, work and my cops	Lections; Seminars; Independent work
3. Explore and solve systems of linear algebraic control equations Iramara , inverse matrix and Gauss;	Lections; Seminars; Independent work
4. Make equations of geometric objects;	Lections; Seminars; Independent work
to know: the foundations of mathematics, physics, computational t Equipment and programming.	

5. to give curves and surfaces of the second order to the canonical Wi-DO;	Lections; Seminars; Independent work
6. Staging and methods for solving the main tasks related to the above concepts.	Lections; Seminars; Independent work
7. Drawing up the linear operator matrices in this basis ;	Lections; Seminars; Independent work
To be able to compare the results of experimental data and the solutions received	
8. find their own vectors of the linear operator;	Lections; Seminars
9. Translate information from a specific task to the language of mathematical symbols and build Mathematical models of simplest systems and processes in natural science and technique;	Lections; Seminars
to know: the foundations of mathematics, physics, computational t Equipment and programming.	
10. choose methods for solving problems based on the analysis of the constructed mathematical model.	Lections; Seminars

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 1				
Didactic unit: Higher algebra				
1. 1.1. Matrix. Operations on matrices. The determinant of the matrix and its properties. Inverse matrix. Building the reverse matrix. 1.2. Linear independence of rows and columns of the matrix. Rank matrix. The invariance of rank for elementary transformations of the matrix. Ring stepped matrix. Calculation of the grade of the matrix using the Gauss algorithm. Theorem on the basic minor. 1.3. Systems of linear equations. Basic concepts and definitions. Matrix solution solution. Cramer formulas. Gauss method. The uniform of the system of linear algebraic equations (the Cappeli theorem).	2	12	1, 3, 6	

2. 2.1. Vectors. Linear operations over vectors and their properties. The concept of linear space. Linear dependence and linear independence of vectors. Base and dimension of linear space. Coordinate systems. Vector coordinates. Linear operations over vectors in coordinate form. 2.2. Scalar product of vectors. Properties of a scalar product. The expression of the scalar product through the coordinates of the vectors in the orthonormal base. Vector length. The angle between vectors. The condition of the orthogonality of vectors. Vector cosine guides. Projection of the vector, properties of projections. 2.3. Vector art and its properties. The expression of the vector product through the coordinates of the vectors in the orthonormal base. Square parallel gram and triangle. The condition of the collinearity of the eyelids.	2	8	2, 7	
Didactic unit: Analytical Geometry				
3. 3.1. The concept of equations of lines and surfaces. Algeb raic lines and surfaces. Plane in pro-space. Vector, general, normal plane equation. Mutual location of the planes. 3.2. Direct in plane and in space. Vector equation, parametric and canonical equations of direct. Mutual location of direct, straight and planes. Distance from point to direct on the plane and to the plane in space. 3.3. Second order curves. Canonical equations and basic properties. Equations of 2nd order curves in polar coordinates. 3.4. Second-order surfaces. Canonical equations and basic properties. Section method. Rotation surfaces. Cylindrical surface. Cone.	2	8	4, 5	
Didactic unit: Elenament of computers.				

4. 4.1. Linear operator. Linear conversion matrix. Change linear conversion matrix when replacing the basis. Own numbers and own linear transformation vectors. Linear conversion matrix in the base from its own vectors. Operator of a simple structure. The conditions of the simple structure of the operator. 4.2 Linear operator in Euclidean space. Self-adjoint operator. Properties of own numbers and own vectors of a self-adjoint operator. Raving the matrix of the self-adjoint operator to the diagonal form. 4.3 Quadratic forms. Matrix record. Change the quadratic form matrix when replacing the basis. Classification of quadratic forms. Bringing a quadratic form to canonical form. Criteria Sylvester. Law of inertia. Decarta rule. 4.4 Bringing equations of curves and second-order surfaces to canonical form based on the theory of quadratic forms.	2	8	10, 8, 9	

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 1				
Didactic unit: Higher algebra				
1. 1.1. Matrixes and determinants. 1.2. Linear equal systems.	4	10	1, 3, 6	a) studies the methods of solid to perform the first part of the standard calculation (tasks 5, 6, 7); b) getting acquainted with the methods of research and the re-suction of systems of line equations; c) learns to find the decomposition of the basis of the basis of the Basis.
2.	2	10	2, 7	a) is studying the mutual arrangement of vectors: collinearity, ortility, companar; b) Applies the methods of vector algebra to the re-suction of geometric tasks.
Didactic unit: Analytical Geometry				

3. 3.1. The concept of equations of lines and surfaces. Algeb raic lines and surfaces. Plane in pro-space. Vector, general, normal plane equation. Mutual location of the planes. 3.2. Direct in plane and in space. Vector equation, parametric and canonical equations of direct. Mutual location of direct, straight and planes. Distance from point to direct on the plane and to the plane in space. 3.3. Second order curves. Canonical equations and basic properties. Equations of 2nd order curves in polar coordinates.	2	8	4, 5	
Didactic unit: Elenament of computers.				
4. 4.1. Linear operator. Linear conversion matrix. Change linear conversion matrix when replacing the basis. Own numbers and own linear transformation vectors. Linear conversion matrix in the base from its own vectors. Operator of a simple structure. The conditions of the simple structure of the operator. 4.2 Linear operator in Euclidean space. Self-adjoint operator. Properties of own numbers and own vectors of a self-adjoint operator. Raving the matrix of the self-adjoint operator to the diagonal form. 4.3 Quadratic forms. Matrix record. Change the quadratic form matrix when replacing the basis. Classification of quadratic forms. Bringing a quadratic form to canonical form. Criteria Sylvester. Law of inertia. Decarta rule. 4.4 Bringing equations of curves and second-order surfaces to canonical form based on the theory of quadratic forms.	2	8	10, 8, 9	

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Specialized software

1 Calculator of the cost and timing of the project and its stages according to the COCOMO COCOMO® II.2000.4 methodology

2 Microsoft Office Application Pack

ANNOTATION OF THE PROGRAM

Computer science

Course: 1, semester : 1

		Semester
№	**Kind of activity**	**1**
1	Total credits	6
2	Total hours	216
3	Total classes in the contact form, hours	87
4	Lectures, hours	18
5	Practical lessons, hours	18
6	Laboratory studies, hours	36
7	of them in an active and interactive form, hours	18
8	Consultations, hours	13
9	Independent work, hours	129

External requirements

can use modern information technologies and software, including domestic production When solving the tasks of professional activity; ***regarding the following learning results*****:**
To be able to: choose modern information technology and software, including domestic production, when solving professional activity tasks.
can develop algorithms and programs suitable for practical applications in the field of information systems and technologies; ***regarding the following learning results*****:**
Having skills: programming, debugging and testing prototypes of software and technical complexes.
is able to choose platforms and instrumental software and hardware for the implementation of information systems; ***regarding the following learning results*****:**
Know: Main platforms, technologies and instrumental software for the implementation of information systems.

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes
To be able to: choose modern information technology and software, including domestic production, when solving professional activity tasks.	
1. To be able to apply the main methods, methods and means obtaining, storing and processing information using computers and computer tools	Lections; Seminars; Laboratory works; Independent work
2. to be able to Use the most common office and mathematical packages of application programs	Lections; Laboratory works; Independent work
3. To be able to use specialized software when solved and professional tasks	Lections; Laboratory works; Independent work

4. To be able to use languages ??and programming systems To solve professional tasks	Lections; Independent work
5. to be able to assess the state and trends in the development of information technologies and computer science in modern society	Lections; Seminars; Laboratory works; Independent work
6. To be able to perform a patent search	Lections; Independent work
Having skills: programming, debugging and testing prototypes of software and technical complexes.	
7. to know the role of information in the development of the modern information society	Lections; Independent work
8. To be able to use the elementary algorithm and programming skills in one of the high-level languages ??as a software Simulation of studied objects and processes	Lections; Seminars; Laboratory works; Independent work
9. to be able to conduct bibliographic and information and search work, Use its results when solving professional tasks and design of scientific papers	Lections; Independent work
10. To be able to conduct software configuration	Lections; Laboratory works; Independent work
11. To be able to install software	Lections; Laboratory works; Independent work
12. Know how the installation of software is going on	Laboratory works; Independent work
Know: Main platforms, technologies and instrumental software for the implementation of information systems.	
13. Basic architectures of computers	Lections; Independent work
14. to know the tools and methods for modeling business processes organization	Lections
15. to know the essence and importance of information in the development of modern society, danger and threats arising in this process	Lections; Laboratory works; Independent work
16. to know the legal basis information security and principles of copyright protection for software products	Lections; Laboratory works; Independent work
17. Be able to search for information in local and global networks.	Lections; Laboratory works; Independent work
18. own a personal computer as a means of information management	Lections; Seminars; Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 1				
Didactic unit: Basics of computer architecture and programming languages ??				
1. The history of the development of programming languages.		2	10, 11, 13, 14, 15, 18, 6, 7	Lecture.
2. Systems for the number of temperature control		2	1, 15, 18, 8	Lecture.
3. Data Types		2	11, 5, 9	Lecture.
Didactic unit: Basics of analyzing and designing programs in STI				
4. Preparation and execution of programs		2	15, 16, 18, 2, 5, 9	Lecture.
5. Address arithmetic		2	1, 15, 16, 18	Lecture.

6. Magnetic moment of atom. Magnetic field in substance. Magnetic permeability conditions for the field on the border of the section of two magnetics. Paramagnetics, diamagnetics, ferromagnetics, antiferromagnetics. Hysteresis in ferromagnets.		2	15, 17, 18, 2, 3, 4	Lecture.
7. Classification of electrical transport devices.		2	1, 18, 5, 9	Lecture.
8. Preprocessor		2	10, 18, 6	Lecture.
9. Input Output		2	16, 18, 3, 8	Lecture.

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 1				
Didactic unit: Technology Programming				
1. Studying the operating system		6	1, 15, 16, 18, 2	Laboratory work.
2. Installation of programming system		6	1, 10, 11, 12, 15, 16, 17, 18, 2, 5	Laboratory work.
3. Solution of the square equation	2	6	18, 3, 8	Laboratory work.
4. Solution of the system of equations		6	18, 5, 8	Laboratory work.
5. Enter-output files	4	6	16, 18, 5, 8	Laboratory work.
6. Working with symbols	4	6	1, 18, 5, 8	Laboratory work.

Table 3.3

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 1				
Didactic unit: Technology Programming				
1. Finding the amount, works, factorials	4	4	1, 18, 5, 8	Practice .
2. Study of the structure of embedded types (integers, floating semicolons)	4	4	1, 18, 5, 8	Practice .
3. Working with static arrays		3	18, 5, 8	Practice .
4. Working with dynamic arrays		2	1, 18, 5, 8	Practice .
5. Registration of programs		5	1, 18, 5, 8	Practice .

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Specialized software

1 Calculator of the cost and timing of the project and its stages according to the COCOMO COCOMO® II.2000.4 methodology

2 Simulation Transport networks and PTV PTV PTV Visum PasteProst

3 Microsoft Office Application Pack

ANNOTATION OF THE PROGRAM
Databases

Course: 3, semester : 5

		Semester
№	**Kind of activity**	**5**
1	Total credits	4
2	Total hours	144
3	Total classes in the contact form, hours	67
4	Lectures, hours	36
5	Practical lessons, hours	0
6	Laboratory studies, hours	18
7	of them in an active and interactive form, hours	18
8	Consultations, hours	11
9	Independent work, hours	77

External requirements

can use modern information technologies and software, including domestic production When solving the tasks of professional activity; ***regarding the following learning results*****:**
have skills: applying modern information technologies and software, including domestic Production, when solving problems of professional activity
to know: Modern information technology and software, including domestic production, when solving the tasks of a professional figure ost.
is able to participate in the development of technical documentation related to professional activities using standards, norms and rules; ***regarding the following learning results*****:**
To be able to apply a statistical approach to researching processes and solving problems
is able to search, critical analysis and synthesis of information, apply a systematic approach to solving the set Tasks; ***regarding the following learning results*****:**
To be able to: apply search, collection and information processing techniques; Creit analysis and synthesis of information obtained from different sources; Apply the system approach to solve the tasks set.

Requirements for the results of mastering the discipline

The results of the study of the discipline	**Forms of organizing classes**
To be able to: apply search, collection and information processing techniques; Creit analysis and synthesis of information obtained from different sources; Apply the system approach to solve the tasks set.	
1. Know the basic concepts of computer vision	Lections; Laboratory works; Independent work

2. Know the content and implementation of database administration tasks	Lections; Laboratory works; Independent work
3. Know the mathematical models of the main elements of autonomous systems EL The efficiency on the basis of renewable energy sources, as well as methods for calculating the basic parameters of these elements	Lections; Laboratory works; Independent work
4. to be able to create queries for sampling and changing data in MS Access	Lections; Laboratory works; Independent work
5. To be able to create a conceptual database model and receive from It is the composition of relationships	Lections; Laboratory works; Independent work
6. Know Methods Data integrity	Lections; Laboratory works; Independent work
to know: Modern information technology and software, including domestic production, when solving the tasks of a professional figure ost.	
7. to know the syntax of the main operators (instructions) of the SQL language	Lections; Laboratory works; Independent work
8. Know the principles of processing large data in distributed computing systems.	Lections; Laboratory works; Independent work
9. Know the main architectures of database systems	Lections; Laboratory works; Independent work
10. to know the subject of social philosophy and the structure of public consciousness	Lections; Laboratory works; Independent work
11. Numerical methods for solving mathematical problems	Lections; Laboratory works; Independent work
12. The main provisions of the database theory, data stores, data showcases , databases, conceptual, logical and physical data models	Lections; Laboratory works; Independent work
have skills: applying modern information technologies and software, including domestic Production, when solving problems of professional activity	
13. To be able to create a database user interface: Menu, forms, toolbars, etc.	Lections; Laboratory works; Independent work
14. Know the main provisions of the database theory: relational algebra and its basic operators	Lections; Laboratory works; Independent work
15. to know the structure and content of the relational data model	Lections; Laboratory works; Independent work
16. to know the types of files and organization of the internal level of files in database systems	Lections; Laboratory works; Independent work
17. Know the appointment and basic concepts of the model "Essence - Communication"	Lections; Laboratory works; Independent work
18. To be able to determine and provide effective technological process modes for a given method.	Lections; Laboratory works; Independent work
To be able to apply a statistical approach to researching processes and solving problems	
19. to set the direction of displacement of the chemical equilibrium of reactions depending on the parameters of the system	Lections; Laboratory works; Independent work
20. To be able to analyze the initial data	Lections; Laboratory works; Independent work
21. to be able to perform the normalization of relationship structures. databases	Lections; Laboratory works; Independent work
22. To be able to practically create the structure of relational databases in the MS Access DBMS environment	Lections; Laboratory works; Independent work
23. Know the main components of operating systems, their purpose and relationship.	Lections; Laboratory works; Independent work
24. Know the essence and methods of normalization of relationships	Lections; Laboratory works; Independent work
25. Know Methods and Strategies for Database Recovery	Lections; Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 5				
Didactic unit: Introduction and basic concepts				
1. Content and course tasks. Basic concepts. Course organization. The concept of the base and database and DBMS. BD schemes. DBMS components.	1	2	1, 19, 20	lecture. Studying theoretical information.
2. Data model. The concept of a data model. Overview of data models. Relational data model. Object-relational model. Object-oriented data model.	1	2	14, 19	Lecture. Study of theoretical information. Solving exercise.
3. Database architecture. Local database. DB file server. Client - server databases. Distributed database. ODBC and OLE DB standards.	1	2	11, 12, 19, 9	lecture. Studying theoretical information.
4. relational algebra Relational algebra. Relational algebra operators. Application examples.	1	2	14, 19	Lecture. Study of theoretical information
Didactic unit: Elements of nuclear physics and physics of elementary particles				
5. Purpose and organization of SQL language SQL components and instructions. Purpose and string of SQL language. SQL components and instructions. Types of language data. Select Sampling Instructions. Using SELECT in one-bit and multi-fold requests.	2	4	11, 19, 4, 7	Lecture. Studying tori material. Practice in using SQL
6. Creating data structures using SQL SQL nucleation to create and change tables, representations and indexes.		2	13, 19, 22, 7	Lecture. Study of teretric information. Exercise performance.
7. Data access control using SQL SQL instructions for data access control.	1	2	11, 19, 4, 7	Lecture. Study of theoretical material. Exercise.
Didactic unit: Model "Entity - Communication (conceptual design of databases). Normalization of relationships. Creating applications.				

8. Model "Essence - Communication". The concepts of entity, attribute and communications. Creating a model and chart "Entity - Communication". Receiving relationships from the model "Essence - Communication". Extended Models "Essence - Communication"	2	4	15, 17, 19, 3, 5, 6	Lecture. Study of theoretical material. Exercise.
9. Normalization of relationships. Objectives of normalization of relations. Functional dependencies of attributes of relationships. Normal forms of relationships. Normal forms of relationships. Normalization procedures. Examples.		4	19, 21, 24	Lecture. Study of theoretical material. Exercise.
Didactic unit: Transaction control and locks in databases. Administration of database.				
10. Transactions in the database. Transactions in the database. Properties and parameters of transactions. Transaction logs. Transactions in MS Access.	1	2	10, 13, 19	lecture. Study of theoretical material.
11. Data lock Transactions in multiplayer mode. Data blocking. Lock control.	1	2	10, 15, 19, 7	Lecture. Study of theoretical material.
12. Protection and database administration The total contents of the BD protection. Computer protection means. Administration of database. Backup and restore database.	2	4	13, 18, 19, 2, 23, 25, 8	Lecture. Study of theoretical information. Exercise.
Didactic unit: Physical data organization. Architecture and occupied database systems				
13. Physical organization of database files Physical and logical records. Serial files. Index and indexed files. Checked files.	1	2	16, 19	Lecture. Study of theoretical material
14. Distributed databases (Introduction). Distributed databases and distributed DBMS. Architecture of distributed DBMS. Types of distributed DBMS. Oracle DBMS (Basic Information).		2	19, 9	Lecture. Study of theoretical information

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities

Semester: 5				
Didactic unit: Introduction and basic concepts				
1. Creating databases, tables, working with tables in the MICROSOFT Access DBMS	1	5	1, 10, 12, 14, 15, 16, 17, 18, 2, 20, 21, 22, 23, 24, 25, 3, 5, 6, 8, 9	Laboratory work. Acquisition of practical skills for creating databases, tables, indexes, data search and data on DBMS MS Access
Didactic unit: Elements of nuclear physics and physics of elementary particles				
2. Creating requests and reports in the MICROSOFT Access DBMS environment.	1	5	1, 10, 12, 14, 15, 16, 17, 18, 19, 2, 20, 21, 23, 24, 25, 3, 4, 5, 6, 7, 8, 9	Laboratory work. Acquisition of querying and reporting skills in MS Access.
Didactic unit: Model "Entity - Communication (conceptual design of databases). Normalization of relationships. Creating applications.				
3. Creating forms and user interface in MS Access medium.	1	4	1, 10, 12, 13, 14, 15, 16, 17, 18, 2, 20, 21, 23, 24, 25, 3, 5, 6, 8, 9	Acquisition of practical skills for creating a menu, forms, macros for processing events in MS Access environment
Didactic unit: Transaction control and locks in databases. Administration of database.				
4. Work in MS Access with MS SQL Server databases	1	4	1, 10, 11, 12, 14, 15, 16, 17, 18, 2, 20, 21, 22, 23, 24, 25, 3, 5, 6, 8, 9	Laboratory work. Acquaintance with the architecture and work of the "Client-Server" database based on the transformation of the local MS Access database to the MS SQL database

Table 3.3

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 5				
Didactic unit: Introduction and basic concepts				
1. Data Model. Relational algebra. Database architecture.		5	1, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 4, 5, 6, 7, 8, 9	independent work. Study of theoretical information.
Didactic unit: Elements of nuclear physics and physics of elementary particles				
2. SQL language.		5	1, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 2, 20, 21, 22, 23, 24, 25, 3, 4, 5, 6, 7, 8, 9	Independent work. Practical learning of SQL query processing language.
Didactic unit: Model "Entity - Communication (conceptual design of databases). Normalization of relationships. Creating applications.				

3. Conceptual and logical design databases		5	1, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 2, 20, 21, 22, 23, 24, 25, 3, 4, 5, 6, 7, 8, 9	Independent work. Studying tori material. Exercise performance.
Didactic unit: Transaction control and locks in databases. Administration of database.				
3. Transaction management. Protection and database recovery		5	1, 10, 11, 12, 14, 15, 16, 17, 18, 19, 2, 20, 21, 22, 23, 24, 25, 3, 4, 5, 6, 7, 8, 9	independent work. Study of theoretical information.
Didactic unit: Physical data organization. Architecture and occupied database systems				
4. Physical organization of data files.		3	1, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 2, 20, 21, 22, 23, 24, 25, 3, 4, 5, 6, 7, 8, 9	Independent work. Study of theoretical material.

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Methodical support and software

Methodological support

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Specialized software

1 Microsoft Office Application Pack

2 Office software package The Document Foundation LibreOffice

3 Calculator of the cost and timing of the project and its stages according to the COCOMO COCOMO® II.2000.4 methodology

ANNOTATION OF THE PROGRAM

Safety of vital activity

Course: 3, semester : 6

		Semester
№	**Kind of activity**	**6**
1	Total credits	3
2	Total hours	108
3	Total classes in the contact form, hours	66
4	Lectures, hours	36
5	Practical lessons, hours	18
6	Laboratory studies, hours	0
7	of them in an active and interactive form, hours	0
8	Consultations, hours	10
9	Independent work, hours	42

External requirements

is able to create and maintain safe life conditions, including in emergency situations; ***regarding the following learning results*:**
Conditions to apply in professional and daily activities. Methods of protection against hazards, including in the threat and emergence of emergency situations and military conflicts, and ways to ensure safe livelihoods.
Know the basics of life safety, has an idea of ??how to create safe conditions that ensure sustainable development of society in professional and daily activities and the preservation of the environment.
owns the victim first aid skills.

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes

Know the basics of life safety, has an idea of ??how to create safe conditions that ensure sustainable development of society in professional and daily activities and the preservation of the environment.	
1. UK-8. 1 1. Know the basics of life safety, has an idea of ??how to create safe conditions that ensure sustainable development of society in professional and daily activities and the preservation of the environment.	Lections; Seminars; Independent work

Conditions to apply in professional and daily activities. Methods of protection against hazards, including in the threat and emergence of emergency situations and military conflicts, and ways to ensure safe livelihoods.	
2. UK-8. 2 2. Conditions to apply in professional and daily activities. Methods of protection against dangers, including in the threat and emergence of emergency situations and military conflicts, and ways to ensure safe livelihoods.	Lections; Seminars; Independent work
owns the victim first aid skills.	
3. can work with systemic natural science patterns of professional activity objects	Seminars

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 6				
Didactic unit: Protection in emergency situations				
1. Classification of maniogenous and natural origin. Basic principles, events and ways to protect the population in emergency. Dangerous NSO objects.		4	1, 2	Drawing up the abstract of the lecture material
2. Fire safety and lightning protection.		4	1, 2	Drawing up the abstract of the lecture material
Didactic unit: Software Experiment Management and Data Processing				
3. Basic concepts of BC. Legislative and regulatory documents in the field of BC. Instructions in the workplace. Injury.		2	1, 2	Drawing up the abstract of the lecture material
4. Investigation and accounting of occupational diseases. Insurance against industrial accidents and occupational diseases.		2	1	Drawing up the abstract of the lecture material
Didactic unit: Sanitation sanitation Labor hygiene				
5. The effect of production factors on personnel and ways to protect against them in emergency situations.		6	2	Drawing up the abstract of the lecture material
6. Special assessment of working conditions.		2	1, 2	Drawing up the abstract of the lecture material
Didactic unit: Energy turbines and power plant boilers.				
7. Analyzing the danger of human damage to electric shock.		4	1, 2	Drawing up the abstract of the lecture material
8. Protection measures from human damage by electric shock.		2	1, 2	Drawing up the abstract of the lecture material
Didactic unit: Ecology				
11. Global environmental problems of modernity.		2	1, 2	Drawing up the abstract of the lecture material

12. Environmental pollution. Waste production and consumption.		6	1	Drawing up the abstract of the lecture material
13. Pollution of the city of Novosibirsk.		2	1, 2	Drawing up the abstract of the lecture material

Table 3.2

Themes	**Active forms, hours**	**Hours**	**Links to learning results**	**Learning activities**
Semester: 6				
Didactic unit: Protection in emergency situations				
1. Studying fire safety systems in NSTU.		2	2	Excursion to the university with a democracy of means of warning and rescue
2. Visit to the fire and technical exhibition.		2	1, 2	Studying the fire development NSO services. Organization of fire safety in TsUM, theaters and on large industrial facilities, the use of fire extinguishers (video)
Didactic unit: Software Experiment Management and Data Processing				
3. Investigation and accounting of accidents at work.		4	1, 2	With the help of cases, study and analyze various types of accidents. The second stage is a role-playing game: students form a commission to investigate accidents and draw out an act of investigating an accident on the basis of real materials.
Didactic unit: Sanitation sanitation Labor hygiene				
4. Creating comfortable working conditions in the workplace.		4	1, 2	Analysis of the state of production factors present at any workplace (microclimatic parameters and luminous environments) .
Didactic unit: Energy turbines and power plant boilers.				
5. Working with the simulator cardiovascular resuscitation "Maxim III".		2	2	Working with simulator cardiovascular resuscitation "Maxim III "
6. Consideration and analysis of various emergency situations in office and residential premises.		2	2, 3	Consideration of various ways to hit the electrical current, analysis of the degree of lesion.
7. Studying methods for reducing the risk of human damage from an electric current.		2	1, 2	Studying the ideology of constructing systems of subordinate regulation

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Methodological support

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Specialized software

1 Calculator of the cost and timing of the project and its stages according to the COCOMO COCOMO® II.2000.4 methodology

2 Microsoft Office Application Pack

ANNOTATION OF THE PROGRAM

Diagnostics of electrical equipment of power supply systems

Course: 3, semester : 5

		Semester
№	**Kind of activity**	**5**
1	Total credits	2
2	Total hours	72
3	Total classes in the contact form, hours	42
4	Lectures, hours	18
5	Practical lessons, hours	18
6	Laboratory studies, hours	0
7	of them in an active and interactive form, hours	0
8	Consultations, hours	4
9	Independent work, hours	30

External requirements

is able to search, critical analysis and synthesis of information, apply a systematic approach to solving the set Tasks; *regarding the following learning results*:
To be able to: apply search, collection and information processing techniques; Creit analysis and synthesis of information obtained from different sources; Apply the system approach to solve the tasks set.

Requirements for the results of mastering the discipline

The results of the study of the discipline	**Forms of organizing classes**
To be able to: apply search, collection and information processing techniques; Creit analysis and synthesis of information obtained from different sources; Apply the system approach to solve the tasks set.	
1. Major achievements in the field of circuitry solutions of energy converters	Lections; Seminars; Independent work
2. Use OOP technologies when solving scientific and practical problems	Lections; Seminars; Independent work
3. Principles of pricing in various market structures	Lections; Seminars; Independent work
4. Main types of costs of the company, revenue and profits	Lections; Seminars
5. provide information in signs and symbols (words, formulas, graphs)	Lections; Seminars; Independent work
6. Use the main methods of computing mathematics when solving engineering problems.	Lections; Seminars; Independent work

7. Know the basic principles of building modern automatic control systems, types of mathematical models of objects and control algorithms, the main methods of analysis and optimal synthesis, Extreme and Adaptive Systems, Areas of Application and Features of these methods	Lections; Seminars

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 5				
Didactic unit: Fundamentals of rational economic behavior				
1. Needs, resources and economic selection. Types of economic systems		2	1	Conducting lecture classes
2. Market and Basic Market Structures		2	2, 3, 4	Conducting lecture classes
3. Comparison of patrolled and foreign guests		2	1, 5	Conducting lecture classes
Didactic unit: Financial aspects of project management				
4. Firm, Rule maximizing profits		2	3, 4	Conducting lecture classes
5. Labor and capital markets		2	2, 6	Conducting lecture classes
Didactic unit: Functioning of the national economy				
6. The main macroeconomic indicators. Economic growth		2	1, 5	Conducting lecture classes
7. Macroeconomic instability: Economic cycle, unemployment, inflation		2	1	Conducting lecture classes
Didactic unit: Debugging and programming products				
8. Financial market		2	5, 7	Conducting lecture classes
9. Budget-tax and credit and monetary policy of the state		2	7	Conducting lecture classes

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 5				
Didactic unit: Fundamentals of rational economic behavior				
1. Alternative costs, border of production capabilities. The concept of efficiency		2	1	Solving tasks, discussion
2. Perfect competition, monopoly, monopolistic competition, oligopoly		2	2, 3, 4	Discussion, Solving tasks
3. Factors of supply and demand, Elasticity coefficients		2	1, 5	Solving tasks, test tasks
Didactic unit: Financial aspects of project management				

4. Revenue, production costs, profit		2	2, 6	Solving tasks and tests. Discussion of problems assessing production efficiency.
5. Demand on production factors, discounting		2	3	solving problems. Discussion of the influence of the time factor on the prices of production factors.
Didactic unit: Functioning of the national economy				
6. Calculation of basic macroeconomic indicators and growth rates		2	1, 5	solving problems. Discussion discussion of the problems of the dynamics of the main macroeconomic indicators.
7. Full Employment, Oaken Law, Inflation Indicators, Cycle Phases		2	6	Solving tasks, discussion of issues
Didactic unit: Debugging and programming products				
8. Money and banking system		2	7	Dispersion and polarization.
9. Collective protection of abstracts with a discussion on the chosen topic in the framework of the general topic "Prospects for the development of infocommunication Systems and networks. "		2	5, 7	analysis of macroeconomic models, test tasks

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Methodical support and software

Methodological support

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Specialized software

1 Reference Legal System LLC "Luxith" ATP "ConsultantPlus"

2 Reference Legal System OOO "Guarantor" ATP "Garant"

ANNOTATION OF THE PROGRAM
Distribution

Course: 4, semester : 8

		Semester
№	**Kind of activity**	**8**
1	Total credits	3
2	Total hours	108
3	Total classes in the contact form, hours	35
4	Lectures, hours	16
5	Practical lessons, hours	10
6	Laboratory studies, hours	0
7	of them in an active and interactive form, hours	10
8	Consultations, hours	7
9	Independent work, hours	73

External requirements

is able to determine the range of tasks in the framework of the target and choose the best ways to solve them, based on existing legal norms, resources available and restrictions; *regarding the following learning results*:
to know: types of resources and restrictions for solving professional tasks; Basic methods for evaluating different ways to solve problems; Existing legislation and legal norms regulating professional activities.

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes
to know: types of resources and restrictions for solving professional tasks; Basic methods for evaluating different ways to solve problems; Existing legislation and legal norms regulating professional activities.	
1. UK-2. 1 1. Know: Project Management Methods; Stages of the Project Life Cycle	Lections; Seminars; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 8				
Didactic unit: Theory of state and law				

1. Basics of state theory		2	1	Presentation of theoretical material
2. Fundamentals of the theory of law		2	1	Presentation of theoretical material
Didactic unit: Industries of rights				
3. Constitutional law	2	2	1	Lecture in the form of discussion
4. Basics of civil law	2	2	1	Lectures in the form of a discussion
5. Fundamentals of labor law		2	1	Preparation of lectures
6. Fundamentals of family law	2	2	1	lectures in the form of a discussion
7. Basics of administrative law	2	2	1	Lecture in the form of discussion
8. Fundamentals of criminal law		2	1	Presentation of theoretical material

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 8				
Didactic unit: Theory of state and law				
1. State theory, right theory. Constitutional right		2	1	Discussion of the material passed
Didactic unit: Industries of rights				
2. Basics of civil law. Subjects and civil law institutions	2	2	1	Solutions of situational problems
3. Administrative offense and crime. Countering Corruption		2	1	Solving tasks, discussion of theoretical issues
4. Basics of labor law. Labor discipline		2	1	Discussion of theoretical issues, solving problems
5. Environmental law		2	1	Discussion of theoretical material, a decision of practical situations

Literary sources

Main literature

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Methodical support and software

Methodological support

1. Коровин Н. К. Правоведение [Электронный ресурс] : электронный учебно-методический комплекс / Н. К. Коровин ; Новосиб. гос. техн. ун-т. - Новосибирск, [2013]. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000181677. - Загл. с экрана.

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Specialized software

1 Reference Legal System OOO "Guarantor" ATP "Garant"

2 Reference Legal System LLC "Luxith" ATP "ConsultantPlus"

ANNOTATION OF THE PROGRAM

Probability theory and mathematical statis Tika

Course: 1, semester : 2

		Semester
№	**Kind of activity**	**2**
1	Total credits	5
2	Total hours	180
3	Total classes in the contact form, hours	63
4	Lectures, hours	36
5	Practical lessons, hours	18
6	Laboratory studies, hours	0
7	of them in an active and interactive form, hours	18
8	Consultations, hours	7
9	Independent work, hours	117

External requirements

can apply natural science and general knowledge, methods of mathematical analysis and modeling, theoretical and experimental study in professional activities; *regarding the following learning results*:
To be able to compare the results of experimental data and the solutions received
to know: the foundations of mathematics, physics, computational t Equipment and programming.

Requirements for the results of mastering the discipline

The results of the study of the discipline	**Forms of organizing classes**
to know: the foundations of mathematics, physics, computational t Equipment and programming.	
1. To be able to apply the basic methods of the mathematical apparatus in mathematical models of objects and processes	Lections; Seminars; Independent work
2. to know the methods for solving the tasks of the theory Probability and Mathematical Statistics	Lections; Seminars; Independent work
To be able to compare the results of experimental data and the solutions received	
3. Know the basic methods of solving problems of probability theory and mathematical statistics	Lections; Seminars; Independent work
4. Solve practical tasks	Lections; Seminars; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 2				
Didactic unit: Technological energy systems				
1. Classic definition of probability.		1	2, 3, 4	Lecture.
2. Conditional probability. The theorems of addition and multiplication of probabilities.		1	2, 3, 4	Lecture.
3. Full probability, the Bayes Theorem.		1	2, 3, 4	Lecture.
4. Sequence of experiments with binary outcome. Local and integral theorems of Moava Laplace.		1	2, 3, 4	Lecture.
5. Geometric and statistical determination of probability.		2	2, 3, 4	Lecture.
6. Axiomatic definition of probability.		2	1, 2, 3	Lecture.
Didactic unit: Technology for the development of software and mathematical information systems				
7. Random value. Distribution and density functions, properties.		2	1, 2, 3	Lecture.
8. Numerical characteristics of random variables. Statistical moments. Mathematical expectation and dispersion, their properties.		2	2, 3, 4	Lecture.
9. Discrete distributions: uniform, binomial, Poisson, geometric, hypergeometric.		2	1, 2, 3, 4	Lecture.
10. Continuous distributions: uniform, exponential, passo, normal (Gauss).		2	1, 2, 3, 4	Lecture.
Didactic unit: Limit theorems of probability theory				
11. A group of the theorems constituting the "Large of Numbers".		1	1, 2, 3	Lecture.
12. Central limit theorem, Lyapunov theorem.		1	1, 2, 3	Lecture.
Didactic unit: Mathematical statistics				
13. Subject of mathematical statistics. Sampling of a random variable, its characteristics.		2	1, 2, 3, 4	Lecture.
14. The concept of statistical hypothesis. Classification of hypotheses. General verification scheme.		2	2, 3, 4	Lecture.
15. Point estimates and their properties: consistency, inconsistency, efficiency. Cramera-Rao ratio.		2	1, 2, 3	Lecture.

16. Interval estimates, methods for building confidence intervals.		2	2, 3, 4	Lecture.
17. Trust interval for mathematical expectation.		1	2, 3, 4	Lecture.
18. Moment method for calculating statistical characteristics.		1	2, 3, 4	Lecture.
19. Information on Fisher. Method of maximum truthful.		1	2, 3, 4	Lecture.
20. Distributions used in mathematical statistics: Hee-square, Fisher, Student.		2	2, 3, 4	Lecture.
21. Checking the statistical hypotheses by the High Square method. Lemma Pearson.		2	2, 3	Lecture.
22. Data homogeneity hypothesis, its check.		2	2, 3	Lecture.
23. The criterion of Smirnova-Kolmogorov to test statistical hypotheses.		1	1, 2, 3	Lecture.

Table 3.2

Themes	**Active forms, hours**	**Hours**	**Links to learning results**	**Learning activities**
Semester: 2				
Didactic unit: Technological energy systems				
1. Direct calculus of probabilities.	1	1	1, 2, 4	Practice .
2. Probability addition theorem.		1	1, 2, 4	Practice .
3. Probability multiplication theorem.		1	1, 2, 4	Practice .
4. Formula full probability.		1	1, 2, 4	Practice .
5. Bayes theorem.		1	1, 2, 4	Practice .
6. Geometric probability.		1	1, 2, 3, 4	Practice .
Didactic unit: Technology for the development of software and mathematical information systems				
7. Distribution functions and probability density.	1	1	1, 2, 3, 4	Practice .
8. Discrete random variables. Their distribution functions. A number of probabilities.	1	1	1, 2, 3, 4	Practice .
9. Numeric characteristics of discrete random variables.	1	1	1, 2, 3, 4	Practice. Formation of practical skills to calculate the numerical characteristics of discrete random variables.
10. numerical characteristics of continuous random variables.	1	1	1, 2, 3, 4	Practice. Formation of practical skills to calculate the numerical characteristics of continuous random variables.
Didactic unit: Mathematical statistics				

11. Obtaining samples from random variables distributions.	2	1	1, 2, 3, 4	Practice. Formation of practical skills of obtaining samples from various distributions.
12. Calculation of selective numeric characteristics.	1	1	1, 2, 3, 4	Practice. Formation of practical skills to calculate selective numerical characteristics.
13. Determination of the properties of point estimates.	2	1	1, 2, 3, 4	Practice. Formation of practical skills to study point estimates.
14. Stating confidence intervals.	2	1	1, 2, 3, 4	Practice. Formation of practical skills to build confidence intervals.
15. Method of moments.	1	1	1, 2, 3, 4	Practice. The formation of practical skills to calculate the characteristics of the distribution by the method of moments.
16. Method of maximum likelihood.	1	1	1, 2, 3, 4	Practice. The formation of practical skills to calculate the characteristics of the distribution by the method of maximum likelihood.
17. Checking the hypothesis of the distribution form.	2	1	1, 2, 3, 4	Practice. Formation of practical skills testing hypothesis on the form of distribution.
18. Vague hypothesis about data homogeneity.	2	1	1, 2, 3, 4	Practice. Formation of practical skills of the provinces hypothesis about the homogeneity of data

Table 3.3

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 2				
Didactic unit: Technological energy systems				
1. Comparison of the distinction approaches to the definition of probability.		3	1, 2	Independent work. Deepends an understanding of categories Random event, probability.
2. a priori and a posteriori probability.		2	1, 2, 4	Independent work. Deepends an understanding of the role of the experiment when determining the probability of a random event.
3. Invalid and independent random events. Example Bernstein.		2	1, 2	Independent work. Deepends an understanding of categories Random event, probability.
4. Buffon's task. The task of the meeting.		3	4	Independent work. Deepens the understanding of the geometric, probability definition.
5. Proof of local and integral theorem Moava - Laplace.		4	2	independent Job. Explains the role of the normal distribution in the theory of probabilities.
Didactic unit: Technology for the development of software and mathematical information systems				
6. Cauchy, Laplace, Relay, Areas of their use.		4	2, 4	Independent work. Expands knowledge of continuous random quantities.

7. The time of trouble-free operation of the equipment. Waibulla distributions.		4	4	Independent work. Expands knowledge of continuous random quantities.
8. Moments of normal distribution.		3	4	Independent work. Expands knowledge of continuous random quantities.
9. Polynomial distribution.		3	4	Independent work. Expands knowledge of continuous random quantities.
Didactic unit: Limit theorems of probability theory				
10. Proof of the central limit theorem of the theory of probability.		4	2	independent Job. Explains the role of the normal distribution in the theory of probabilities.
11. Proof of Lyapunov theorem.		4	2	independent Job. Explains the role of the normal distribution in the theory of probabilities.
Didactic unit: Mathematical statistics				
12. General aggregate, sample from the General Squadability.		2	3	Independent work. Expands the understanding of the sample category.
13. Methods for obtaining sampling.		4	3	Independent work. Demonstrates the value of the sample for statistical studies.
14. Histogram and cumulative curve.		2	3	Independent work. Demonstrates the value of the sample for statistical studies.
15. Statistics, ordinal statistics, sufficient statistics.		4	2, 3	Independent work. Expands understanding categories sampling and information.
16. Displaced and non-evaluated evaluation of dispersion.		2	2	Independent work. Deepends an understanding of the properties of point estimates.
17. Asymptotically normal estimates.		3	2, 3	Independent work. Deepends an understanding of the properties of point estimates.
18. Interval estimates on the sample from the normal distribution.		3	2, 3, 4	Independent work. Deepends an understanding of the interval estimation.

Literary sources

Main literature

1. Методы математической статистики : учебное пособие для студентов НГТУ 2 курса очного и заочного отделений всех направлений и специальностей / [М. Ю. Васильчик и др.] ; Новосиб. гос. техн. ун-т. - Новосибирск, 2016. - 62, xxiv с. : ил., табл.. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000227595

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Methodical support and software

Methodological support

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Specialized software

1 Calculator of the cost and timing of the project and its stages according to the COCOMO COCOMO® II.2000.4 methodology

2 Microsoft Office Application Pack

ANNOTATION OF THE PROGRAM
Programming

Course: 1 2, semester ы : 2 3

		Semester	
№	**Kind of activity**	**2**	**3**
1	Total credits	7	5
2	Total hours	252	180
3	Total classes in the contact form, hours	64	78
4	Lectures, hours	18	36
5	Practical lessons, hours	0	0
6	Laboratory studies, hours	36	36
7	of them in an active and interactive form, hours	10	8
8	Consultations, hours	8	4
9	Independent work, hours	188	102

External requirements

is able to participate in the development of technical documentation related to professional activities using standards, norms and rules; *regarding the following learning results*:
Having skills: compiling technical documentation at various stages of the information system's life cycle.
is able to install software and hardware for information and automated systems; *regarding the following learning results*:
Having skills: installation and hardware installation of information and automated systems.
can develop algorithms and programs suitable for practical applications in the field of information systems and technologies; *regarding the following learning results*:
Know: methods of algorithmization, language and programming technologies suitable for practical application in the field of information systems and technologies
To be able to: apply B methods of algorithmization, languages ??and programming technologies in solving professional tasks in the field of information systems and technologies

Requirements for the results of mastering the discipline

The results of the study of the discipline	**Forms of organizing classes**
Know: methods of algorithmization, language and programming technologies suitable for practical application in the field of information systems and technologies	
1. On the principles of object-oriented Approach when designing programs in high-level languages.	Lections; Laboratory works; Independent work
Having skills: installation and hardware installation of information and automated systems.	
2. on the principles of programming "under Windows"	Lections; Laboratory works; Independent work

Know: methods of algorithmization, language and programming technologies suitable for practical application in the field of information systems and technologies	
3. Basics of high-level languages ??C and C ++.	Lections; Laboratory works; Independent work
4. Thermal power plant installations of thermal electrical stations	Lections; Laboratory works; Independent work
5. system of classes and functions	Lections; Laboratory works; Independent work
6. Principles of program construction	Lections; Laboratory works; Independent work
To be able to: apply B methods of algorithmization, languages ??and programming technologies in solving professional tasks in the field of information systems and technologies	
7. Designing programs using the C ++ language, aimed at engineering applications.	Lections; Laboratory works; Independent work
8. basic foundations of the experiment in the subject area of ??research and development	Lections; Laboratory works; Independent work
Having skills: compiling technical documentation at various stages of the information system's life cycle.	
9. Analyze doubt Identity and disadvantages of the proposed design decisions	Lections; Laboratory works; Independent work
To be able to: apply B methods of algorithmization, languages ??and programming technologies in solving professional tasks in the field of information systems and technologies	
10. Independent application development under Windows OS	Lections; Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 2				
Didactic unit: The concept of object-oriented design (OOP).				
1. The concept of object-oriented design (OOP). The concept of an object, object and class, communication with variable and data type.	1	1	1, 10, 8, 9	Lecture.
Didactic unit: A brief overview of C ++ features in comparison with C.				
2. A brief overview of C ++ features in comparison with C: assignment of structures, structure as formal parameters and results of functions, redefine operations and functions; Function elements; dynamic memory management operators; Links.		1	10, 3, 8, 9	Lecture.
Didactic unit: Definition of class.				

3. Definition of the class. Elements-data and class elements. General, private and protected class elements. Objects and properties, lifetime and initialization. Definition of the designer and destructor, their properties. Assignment operator. Object Types: External, Automatic, Dynamic, Temporary.		2	10, 4, 5, 8, 9	Lecture.
Didactic unit: Signal Converters				
4. Two examples of class development (date and matrix of variable dimension).		2	10, 4, 8, 9	Lecture.
Didactic unit: Override (overload) of operations.				
5. Override (overload) of operations. Example. Override functions. Example. Features of override some operations: type transformation; indexation; Dynamic memory, assignment.		2	10, 3, 4, 8, 9	Lecture.
Didactic unit: Action and result when performing an element-function or override operation.				
6. action and result when performing an element-function or override operation. Result Types: Empty, Basic, Index and Link to Object, Object. Temporary objects. Designer copying and assignment operator, differences between them.		2	10, 3, 4, 8, 9	Lecture.
Didactic unit: Friends of the class (Functions and classes).				
7. Friends class (functions and classes).		2	10, 3, 4, 8, 9	Lecture.
Didactic unit: Hierarchy of classes.				
8. Hierarchy of classes. Basic and derived classes. Availability of their elements. Inheritance. Syntax of design of objects of derived classes.		2	10, 3, 4, 8, 9	Lecture.
Didactic unit: Multiple inheritance.				
9. Multiple inheritance. Virtual basic classes. Abstract classes. Templates.		2	10, 3, 4, 8, 9	Lecture.
Didactic unit: Polymorphism and Virtual Functions.				
10. Polymorphism and virtual functions. Abstract classes and pure virtual functions. Virtual destructors.		2	10, 3, 4, 8, 9	Lecture.
Semester: 3				
Didactic unit: Setting the modeling problem				
11. Streaming input-output in C ++.		2	1, 2, 3, 4, 6, 7	Lecture
Didactic unit: Standard class STD :: String				

12. Standard class STD :: STRING. Row constructors. Access to string symbols. Search operations. Insert operations, replacement and removal of string characters. Line I / O statements.		3	1, 2, 3, 4, 6, 7	Lecture.
Didactic unit: Exception Management				
13. Exceptions. The concept of exception. Processing exceptional situations. Generating exceptions. Intercepting exceptions. Using Try / Catch blocks. Unexpected exceptions and processing of completion.		3	1, 2, 3, 4, 6, 7	Lecture.
Didactic unit: Electromagnetic actuators				
14. Function templates. Overload and specialization of functions templates. Sort functions templates. Class templates. Specialization of class templates. Static members of classes templates. Class - template for vector.		3	1, 2, 3, 4, 5, 6, 7	Lecture.
Didactic unit: Schemes and cycles of vocational schools				
15. Purpose and composition of the STL library. Containers, category containers, serial containers. Iterators. Object functions. Vectors. Lists. Stacks. Queues. Many and multiset. Universal algorithms.		3	1, 2, 3, 4, 5, 6, 7, 8, 9	Lecture.
Didactic unit: Introduction to programming under Windows.				
16. Windows files for Windows. Data Types in Windows. Messaging between applications and Windows OS. Concept of Windows-APL. Windows application structure. Determining window class. Registration class window. Creating and displaying the window. Message processing cycle. An example of a simple Windows program. Microsoft Foundation Classes (MFC) library. Brief description of the library. Development of Windows applications using MFC. Example program.		3	1, 2, 3, 4, 5, 6, 7	Lecture.
Didactic unit: Implementation of the RSIA algorithms				
17. Resource concept. Types of resources. Creating resources. Editing resources. An example of resource development.		2	1, 2, 3, 4, 5, 6, 7	Lecture.

Didactic unit: Processing messages in MFC.				
18. Table messages. Messages from the keyboard. Messages from the mouse.		3	1, 2, 3, 4, 5, 6, 7	Lecture.
Didactic unit: Dynamically Affected DLL Libraries.				
19. concept of DLL. Creating a DLL. Joining the DLL to the program. DLL resources. An example of creating a DLL.		2	1, 2, 3, 4, 5, 6, 7	Lecture.
Didactic unit: Creating console applications.				
20. Creating a console. Enter and conclusion in the console. Processing keyboard and mouse events.		3	1, 2, 3, 4, 5, 6, 7	Lecture.
Didactic unit: Control of power plants				
21. Window classes. Subsidiaries. Windows elements: scroll bar, status panel, toolbar.		3	1, 2, 3, 4, 5, 6, 7	Lecture.
Didactic unit: The context of the GDI-object device.				
22. The concept of the graphical interface of the device (GDI). Contexts of devices. Graphic classes. Graphic objects. Construction of geometric shapes. Creating types of brushes and feathers. Display test. Raster images. Creating fonts.		3	1, 2, 3, 4, 5, 6, 7	Lecture.
Didactic unit: A multi-document interface. Development of Applications App Wizard.				
23. The concept of a multi-document interface (MDI). Desktop application, child windows, viewing and ordering windows. Creating an MDI application using MFC. MDI and Drag and Drop technology. Sample MDI software application. Creating an application template. Creating a one-barker application using the App Wizard. Creating a multi-node application.		3	1, 2, 3, 4, 5, 6, 7	Lecture.

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 2				
Didactic unit: Signal Converters				

1. Develop a class - type of data (TD) with overridency of operators. Develop an input function, output, a basic set of content operations over TD (for example, arithmetic and comparison) - 4 hours. Data type options: a) whole arbitrary lengths represented by a row of numbers; b) the same, but in the internal binary representation (dynamic array of bytes); c) variable dimension matrices; d) a sparse matrix of variable dimension, nonzero elements are represented by a dynamic array with elements (x, y, v); e) fractions; e) date and time; g) complex numbers; h) Class variable matrices are cut, non-zero elements are represented by a single-connected list.	1	6	6, 7, 9	Laboratory work.
2. Develop an abstract basic class Object, and for it to provide clean virtual methods. Established earlier class - TD, make the heir from Object. At the same time, override the net virtual methods of class Object by filling them with specific content.	2	8	1, 2, 3, 4, 5, 6, 7, 9	Laboratory work.
Didactic unit: Friends of the class (Functions and classes).				
3. function. Overload functions. Functions. The default arguments.	2	8	1, 10, 2, 3, 4, 5, 6, 7, 9	Laboratory work.
Didactic unit: Multiple inheritance.				
4. classes. Override standard operations.	2	8	1, 10, 2, 3, 4, 5, 6, 7, 9	Laboratory work.
Didactic unit: Polymorphism and Virtual Functions.				
5. Virtual functions. Pure abstract classes.	2	6	1, 3, 5	Laboratory work.
Semester: 3				
Didactic unit: Schemes and cycles of vocational schools				

6. Develop a template class (using the standard STL templates library) that implements a specific storage structure (so-called "container" class). The data in the container is stored either as pointers to objects or in the form of the objects themselves. Storage Structures: a) binary tree; b) an array; c) a single-connected linear list; d) dvin-combined cyclic list. Develop a demonstration program	1	4	1, 10, 2, 3, 4, 5, 6, 7, 8, 9	Laboratory work.
7. Purpose: Master the standard templates library (STL). General requirements: "To refer to the elements of a specified container, be sure to use the appropriate iterators. "If the task provides sorting, it must be performed using the SORT algorithm from STL. "Error processing must be implemented by dischargeing exceptions - Exception class objects. "Program work to check on the files of a very large size. Option 1. The names of the input text file are specified (exists on the disk) and the output file (created by the program). Count all lines input file to container Vector <ansistring>. Sort the strings in the container in alphabetical order, convert to the top register and write them down to the output file. Option 2. The names of the input text file are specified (exists on the disk) and the output file (created by the program). You started the position of the input file rows in the deque <int> container. Using this data and the reversible iterator to record	1	4	1, 2, 3, 4, 5, 6, 7, 8	Laboratory work.

8. Purpose: deepen the knowledge of the standard template library (STL). General requirements: "To refer to the elements of a specified container, be sure to use the appropriate iterators. "If the task provides for the execution of sorting, searching or busting the range, these actions must be performed using the library algorithms or built into the STL functions containers "Error processing must be implemented by dischargeing exceptions - Exception class objects. "Program work to check on the files of a very large size. Option 1. TypeDef std :: vector <ansisting> pages; STD :: List <Pages> Text; Read all strings of a given input file in the data structure - list of pages. Page - vector of 24 lines, objects of the AnSistring class (the last page may be incomplete). Display a page with a specified number. Option 2. TypeDef std :: vector <ansisting> pages; STD :: List <Pages> Text; Read all strings of a given input file in the data structure - list of pages. C	1	4	1, 10, 2, 3, 4, 5, 6, 7, 8, 9	Laboratory work.
Didactic unit: Introduction to programming under Windows.				

9. 1. Working with the inspector of objects. "Create an application with the main window that appears in the center of the screen, with dimensions of 200 to 300 (height, width). "Change the name of the form class on MForm, change the shape title. "To prohibit the resizing of the window and swinging the full screen. "Experimental by finding out what the TForm class is answered by each of the properties. "Draw your own icon using resource editor and assign it an application. 2. Event processing. "Modify the previous application so that the size and position of the main form is automatically calculated when it is created. The position is the right lower angle, height and width are equal to the quarter size of the screen. (ONCREATE EVENING, SCREEN OBJECT) "Place a standard button form. Make it" running out "from the mouse cursor. (Onmousemove event, Left, Top properties) 3. Dialog panel "Modify the application by placing the second button and creating a second form. Make so that when pressing the button appeared form	2	6	1, 10, 2, 3, 4, 5, 6, 7, 8, 9	Laboratory work.
Didactic unit: Dynamically Affected DLL Libraries.				
10. Creating and use of dynamically joined libraries.	1	6	1, 10, 2, 3, 4, 5, 6, 7, 8, 9	Laboratory work.
Didactic unit: Creating console applications.				

11. Serial text files. Options in the order of increasing complexity. On the Four: Option 1. Open the specified text file and display a string with a specified number The file name and number number must be transmitted to the program in the command line arguments. Option 2. The names of the input text file are specified (exists on the disk) and the output file (created by the program). Copy the lines from the input file at the output without changing the order of strings. File names are set in the form of command line arguments. Five: Option 3. The names of the input text file are specified (exists on the disk) and the output file (created by the program). Copy lines from the input file in the output in the reverse order of the rows. File names are set in the form of command line arguments. Option 4. The names of the input text file are specified (exists on the disk) and the output file (created by the program). Copy the lines from the input file at the output in descending order of their length. File names are set as an argument	1	6	1, 10, 2, 3, 4, 5, 6, 7, 8, 9	Laboratory work.

12. Binary arbitrary access files. Options in the order of increasing complexity. On the Four: Option 1. Binary file of fixed-length records. Write a record function to a file with a given name of the array of numbers of the double type and reading from the number file with a specified number. The program should work as follows: if one argument is on the command line (this should be the name of the file), then the function of the record entered from the keyboard of the array of numbers is called if the arguments are two (file name and number number), then the read function is called from the number file with the specified Number and output it on the screen. Five: Option 2. Open the specified text file and write all its lines into the binary file of the variable length recorder (each line is written as a record of two fields [Length] [Content]). After that, you must open the created file and output its contents on the screen. The name of the input (text) file is set as the command line argument. The name of the output (binary) file is generated by the program.	1	6	1, 2, 3, 4, 5, 6, 7, 8	Laboratory work.

Table 3.3

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 2				
Didactic unit: Friends of the class (Functions and classes).				
1. Friendly functions and friendly classes. Designer and operation New.		10	1, 2, 3, 4, 5, 6	Independent work.
Didactic unit: Polymorphism and Virtual Functions.				
2. Early and later (dynamic) binding. Virtual functions. Pure abstract classes.		5	1, 2, 3, 4, 5, 6	Independent work.

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Methodical support and software

Methodological support

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Specialized software

1 Integrated development environment Microsoft Visual Studio

ANNOTATION OF THE PROGRAM

Electrical Equipment

Course: 2, semester : 3

		Semester
№	**Kind of activity**	**3**
1	Total credits	4
2	Total hours	144
3	Total classes in the contact form, hours	65
4	Lectures, hours	18
5	Practical lessons, hours	18
6	Laboratory studies, hours	18
7	of them in an active and interactive form, hours	8
8	Consultations, hours	9
9	Independent work, hours	79

External requirements

can apply natural science and general knowledge, methods of mathematical analysis and modeling, theoretical and experimental study in professional activities; *regarding the following learning results*:
To be able to compare the results of experimental data and the solutions received
to know: the foundations of mathematics, physics, computational t Equipment and programming.
is able to participate in the development of technical documentation related to professional activities using standards, norms and rules; *regarding the following learning results*:
to know: the main standards for the design of technical documentation at various stages of the information system's life cycle.

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes
to know: the foundations of mathematics, physics, computational t Equipment and programming.	
1. OPK-1. 1 1. Know: Fundamentals of Mathematics, Physics, Computer Engineering and Programming.	Lections; Seminars; Laboratory works; Independent work
To be able to compare the results of experimental data and the solutions received	
2. OPK-1. 2 2. To be able to: solve standard professional tasks with the use of natural science and general engineering knowledge, methods of mathematical analysis and modeling.	Lections; Seminars; Laboratory works; Independent work
to know: the main standards for the design of technical documentation at various stages of the information system's life cycle.	

3. OPK-3. 4 4. Demonstrates an understanding of the principle of operation of electronic devices	Lections; Seminars; Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 3				
Didactic unit: Main onyatia system analysis				
1. Basic concepts, elements and characteristics of electrical circuits. The main laws of electrical chains.		2	1, 2, 3	Studies of theoretical material. Answers to questions
2. Schemes for replacement of the linear electrical circuit. Schemes for replacement of energy sources. Types of electrical chains and methods of their conversion		1	1, 2, 3	Studies of theoretical material. Answers to questions
Didactic unit: Theory and methods for analyzing linear electrical circuits of DC				
3. Compilation of equations for calculating currents in the schemes with the help of laws Kirchhoff. Transferring the source of the EMF and the current source through the electrical circuit assembly. Replacing the branch with an equivalent branch with a source of EDC		2	1, 3	Studies of theoretical material. Answers to questions
4. The method of contour currents. Principle and overlay method. Method of nodal potentials and two nodes. Method of equivalent generator (active two-pole). Balance of capacity		2	1, 2, 3	Studies of theoretical material. Answers to questions
Didactic unit: Telephony and multimedia computer networks.				
5. Ways to represent sinusoidal electrical values. Elements of the electrical circuit of the sinusoidal current.		1	2, 3	Studies of theoretical material. Answers to questions
6. Ohm and Kirchhoff laws for sinusoidal current chains. Symbolic method of calculating sinusoidal circuits		2	2, 3	Studies of theoretical material. Answers to questions
7. Resonant phenomena in linear electrical circuits of sinusoidal current		1	2, 3	Studies of theoretical material. Answers to questions
8. Mutual induction chains		1	2, 3	Studies of theoretical material. Answers to questions
Didactic unit: Transient processes in linear electrical circuits and their methods calculation				

9. Basic concepts and laws used in calculating transient processes in linear electrical circuits. Classic method of calculating transients. Calculation of transition process in chains of the first and second order.	1	4	2, 3	Studies of theoretical material. Answers to questions
10. Operator method for calculating transients		2	2, 3	Studies of theoretical material. Answers to questions

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 3				
Didactic unit: Theory and methods for analyzing linear electrical circuits of DC				
1. Study of the linear resistive DC circuit		6	1, 2, 3	Preliminary calculation of parameters is necessary for the implementation of laboratory studies. Creating a model. Research
Didactic unit: Telephony and multimedia computer networks.				
2. Study of electrical chains of variable sinusoidal current	0,5	6	1, 2, 3	Preliminary calculation of parameters is necessary for the implementation of laboratory studies. Creating a model. Research
3. Study of the operation of the comparison scheme of two electrical values ??in phase	0,5	6	2, 3	Preliminary calculation of parameters is necessary for the implementation of laboratory studies. Creating a model. Research

Table 3.3

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 3				
Didactic unit: Theory and methods for analyzing linear electrical circuits of DC				
1. Equivalent transformations of DC electrical circuits. Calculation of DC electrical circuits using current spreading rules (lever rules).	0,5	2	1, 2, 3	Mastering techniques that make it easy to simplify the source electrical circuit with the help of equivalent receptions and methods of calculating mechanical equipment elements: calculation for strength, fatigue, performance, etc.
2. Calculation of DC circuits using Kirchhoff's laws. Calculation of DC circuits using the contour current method.		2	1, 2, 3	solving problems with the help of the laws of Kirchoff and the contour current methods

3. Calculation of DC circuits using the node potential method. Calculation of DC circuits using the overlay method	1	2	1, 2, 3	solving problems of calculating electrical circuits using the methods of overlay and nodal potentials
4. Calculation of DC circuits using the equivalent generator method	0,5	2	1, 2, 3	Solution of tasks for calculating circuits using the equivalent generator method
Didactic unit: Telephony and multimedia computer networks.				
5. Vector diagrams in the study of linear chains of sinusoidal current. Calculation of linear chains of sinusoidal current using the symbolic method	1	2	2, 3	Mastering the main methods for calculating sinusoidal circuits. Solving problems of calculating the electrical circuits of sinusoidal current using the symbolic method
Didactic unit: Transient processes in linear electrical circuits and their methods calculation				
6. Calculation of transient processes in first-order circuits by the classical method	1	2	2, 3	Mastering the classical method of calculating transient processes using task solutions
7. Calculation of transient processes in second-order circuits by the classical method	0,5	2	2, 3	Mastering the classical method of calculating transient processes using task solutions
8. Calculation of transients in first-order chains by the operator method	1	2	2, 3	Mastering the operator method of calculating transient processes by solving problems
9. Calculation of transient processes in second-order circuits by the operator method	0,5	2	2, 3	Mastering the classical method of calculating transient processes using task solutions

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Methodological support

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Specialized software

1 Software modeling program ELCUT

2 PTC Mathcad

3 Design Science Mathtype

4 Performing a graphic part of the RHZ at the professional level Autodesk Autodesc AutoCAD

5 Microsoft Office Application Pack

6 Editor diagrams and block diagrams for Windows Microsoft Visio

ANNOTATION OF THE PROGRAM
Metrology

Course: 2, semester : 3

		Semester
№	**Kind of activity**	**3**
1	Total credits	3
2	Total hours	108
3	Total classes in the contact form, hours	61
4	Lectures, hours	36
5	Practical lessons, hours	0
6	Laboratory studies, hours	18
7	of them in an active and interactive form, hours	18
8	Consultations, hours	5
9	Independent work, hours	47

External requirements

can apply natural science and general knowledge, methods of mathematical analysis and modeling, theoretical and experimental study in professional activities; *regarding the following learning results*:
Having skills: theoretical and experimental study of professional activities
to know: the foundations of mathematics, physics, computational t Equipment and programming.

Requirements for the results of mastering the discipline

The results of the study of the discipline	**Forms of organizing classes**
to know: the foundations of mathematics, physics, computational t Equipment and programming.	
1. Know the main techniques and laws for creating documentation for hardware and software components of information systems	Lections; Laboratory works; Independent work
2. Know the principles of presentation and reasoned protection of the results of completed work	Lections; Laboratory works; Independent work
3. Know the main units and methods for measuring electrical values ??	Lections; Laboratory works; Independent work
4. to know how to evaluate the error of indirect measurements	Lections; Laboratory works; Independent work
Having skills: theoretical and experimental study of professional activities	
5. To be able to select the measuring equipment at the required error	Lections; Laboratory works; Independent work
6. To be able to use technical means for measuring various physical quantities	Lections; Laboratory works; Independent work

7. To be able to measure with an analog or digital measuring instruments	Lections; Laboratory works; Independent work
8. To be able to conduct a preliminary feasibility study of the project development of professional activity objects	Lections; Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 3				
Didactic unit: Scientific and legislative metrology.				
1. Metrology. Theoretical foundations of metrology. Quantitative and qualitative properties of objects. Basic concepts and definitions. Measures. Measurement result. Multiple measurements. Measurement errors, sources of errors. Processing measurement results. Basic provisions. Scientific and legislative metrology. Legal fundamentals of the Law of the Russian Federation "On Ensuring Unity of Measurements". The structure of the metrological service in the country, in the enterprise, in organizations that are legal entities, its functions. Metrological support, standards, exemplary and working measures, testing schemes, state metrological laboratories, measuring equipment and other measurement tools. Metrological characteristics of measuring instruments, their rationing.		4	1, 2, 3, 6, 7, 8	Lecture.
Didactic unit: Means of measurement of electrical values.				
2. Signals of measuring information - voltage, currents - their varieties; Pulses. Interference.		4	3, 6, 7, 8	Lecture.
3. Structural schemes and properties of measuring instruments in static mode - direct transformation and compensatory means; Their additive and multiplicative error. Means of measurements in the dynamic mode - links of the first and second orders; Dynamic error.		4	3, 6, 7, 8	Lecture.

4. Means of measurement of electrical values. Analog devices. Instant, amplitude, secondary, rms and medium-sized signal value. The accuracy class of the device and the number of scale divisions.		4	3, 5, 6, 7, 8	Lecture.
5. Digital devices. Analog-to-digital converters (ADC), type of ADC: a parallel comparison, deploying transformation, parallel action, with two-stroke integration. ADC of time, frequency, phase differences.		4	3, 5, 6, 7, 8	Lecture.
6. Oscilloscopes, digital oscilloscope		4	3, 5, 6, 7, 8	Lecture.
Didactic unit: Means of measurement of magnetic and non-electrical values.				
9. Virtual measuring instruments.		3	3, 4, 5, 6, 7, 8	Lecture.
10. Means of measurement of magnetic and non-electrical values. Primary converters (sensors). Resistance sensors, magnetoresistance sensors, containers, inductance. Sensors for accurate measurement of geometric sizes, roughness, movement, temperature. Measuring information systems		3	3, 4, 5, 6, 7, 8	Lecture.
Didactic unit: Standardization and certification.				
11. Legal and historical basics of standardization, scientific base of standardization and certification. Objectives and objectives of standardization - safety, health protection, environmental protection, compatibility and interchangeability, improving product quality, human and material resource saving, elimination of technical barriers. Categories and types of standards. Basic principles and standardization methods. State and international standardization systems. Simpification, unification, typing, aggregation. Numeric rows. State control and supervision of compliance with standards. International cooperation in the field of standardization and an international organization for standardization (ISO).		3	1, 3, 6, 7, 8	Lecture.

12. Basic objectives, objects, schemes and certification systems. Certification of products, products, services, consumer protection. Mandatory and voluntary certification. Certification system GOST R. Rules and certification procedure. Testing laboratories, certification bodies; their accreditation. Expert methods for assessing quality. Inspection control. Compliance documents: Statement of conformity, certification of conformity, certification of compliance, document of the third party.		3	3, 5, 6, 7, 8	Lecture.

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 3				
Didactic unit: Means of measurement of electrical values.				
1. Measurement of combined devices. Evaluation of the basic instrumental errors of measurement results	6	4	1, 2, 3, 5, 6, 7	Laboratory work.
2. Evaluation of methodological and additional instrumental errors in measurements	4	4	1, 2, 3, 5, 6, 7	Laboratory work.
3. Signal observation and measurement of their parameters with electronic oscilloscopes	4	4	1, 2, 3, 4, 5, 6	Laboratory work.
Didactic unit: Standardization and certification.				
4. Statistical processing of measurement results. Verification of measuring instruments	4	6	1, 2, 3, 6, 7, 8	Laboratory work.

Literary sources

Main literature

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3. https://e.lanbook.com/

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5. http://znanium.com/

Methodical support and software

Methodological support

1. Колочева В. В. Метрология, стандартизация и сертификация [Электронный ресурс] : электронный учебно-методический комплекс / В. В. Колочева ; Новосиб. гос. техн. ун-т. - Новосибирск, [2014]. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000156379. - Загл. с экрана.

2. Основы метрологии : программа, методические указания, вопросы для самопроверки и контрольные задания для 2 и 3 курсов технических факультетов заочной формы обучения / Новосиб. гос. техн. ун-т ; [сост. Г. Г. Матушкин]. - Новосибирск, 2008. - 62, [2] с. : ил., табл.. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000088374

Specialized software

1 Microsoft Office Application Pack

2 Calculator of the cost and timing of the project and its stages according to the COCOMO COCOMO® II.2000.4 methodology

ANNOTATION OF THE PROGRAM
Process modeling and systems

Course: 2, semester : 4

		Semester
№	**Kind of activity**	**4**
1	Total credits	4
2	Total hours	144
3	Total classes in the contact form, hours	78
4	Lectures, hours	36
5	Practical lessons, hours	0
6	Laboratory studies, hours	36
7	of them in an active and interactive form, hours	18
8	Consultations, hours	4
9	Independent work, hours	66

External requirements

can apply natural science and general knowledge, methods of mathematical analysis and modeling, theoretical and experimental study in professional activities; ***regarding the following learning results*:**
To be able to compare the results of experimental data and the solutions received
is able to apply mathematical models, methods and means of designing information and automated systems; ***regarding the following learning results*:**
Having skills: Simulation and design of information and automated systems
To be able to: apply mathematical models, methods and methods in practice. Means of design and automation of systems in practice.
to know: Methodology and basic methods of mathematical modeling, classification and conditions of use of models, basic methods and means of designing information and automated systems, tools modeling and designing information and automated systems.

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes
To be able to compare the results of experimental data and the solutions received	
1. To be able to solve standard professional tasks using methods of mathematical modeling	Lections; Laboratory works; Independent work
to know: Methodology and basic methods of mathematical modeling, classification and conditions of use of models, basic methods and means of designing information and automated systems, tools modeling and designing information and automated systems.	
2. Know the methods of mathematical modeling in the field of professional activity	Lections; Laboratory works; Independent work

To be able to: apply mathematical models, methods and methods in practice. Means of design and automation of systems in practice.	
3. To be able to apply mathematical models for designing information systems	Lections; Laboratory works; Independent work
Having skills: Simulation and design of information and automated systems	
4. Know the basic instrumental means of modeling and designing information systems	Lections; Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 4				
Didactic unit: The main provisions of modeling theory processes and systems				
1. Evolution of the concept of the system.	0	2	2	Lecture
2. Properties of systems, their classification	0	2	2, 4	Lecture
Didactic unit: Theory of multi-agent systems, questions of its practical application when solving various applied tasks				
3. Definition and basic properties of Petri nets. Marking. Petri networks	0	2	2, 3, 4	Lecture
4. Tasks are solved for Petri nets: achievability, security, saving	0	2	2, 3, 4	Lecture
5. Petri network analysis methods: Building Davilding Tree, Matrix Analysis.	0	2	2, 3, 4	Lecture
6. Simulation of the logical structure of systems of Petri nets	0	2	1, 2, 3, 4	Lecture
Didactic unit: Method Monte Carlo				
7. The main provisions of the theory of random quantities. Functions of the distribution and density of probability	0	2	2, 4	Lecture
8. Modeling stochastic processes by Monte Carlo	0	2	2, 3, 4	Lecture
9. Uniform continuous distribution. Generators random numbers. Pseudo-random numbers	0	2	2, 3, 4	Lecture
10. Calculation of certain integrals by Monte Carlo	0	2	2, 3, 4	Lecture
11. Process modeling passage of neutron flux through a flat parallel plate	0	2	1, 2, 3, 4	Lecture
Didactic unit: Theory of mossary maintenance systems				
12. Definition and classification of mass maintenance systems	0	2	1, 2, 3, 4	Lecture
13. Characteristics of the mass maintenance system	0	2	1, 2, 3, 4	Lecture

14. Economic Mass Maintenance Systems	0	2	1, 2, 3, 4	Lecture
15. Input flow of requirements. The simplest stream. Theorem Hinchin	0	2	1, 2, 3, 4	Lecture
16. regular flow. Erlang and palm streams	0	2	1, 2, 3, 4	Lecture
17. Modeling mass maintenance system Markov. Kolmogorov equations for mass system Service	0	2	1, 2, 3, 4	Lecture
18. Theorem Markova. Limit probabilities of states in the mass maintenance system. Crisis situations in mass maintenance systems	0	2	1, 2, 3, 4	Lecture

Table 3.2

Themes	**Active forms, hours**	**Hours**	**Links to learning results**	**Learning activities**
Semester: 4				
Didactic unit: The main provisions of modeling theory processes and systems				
1. Modeling analog signal multiplier	2	4	1, 2, 3, 4	Laboratory work
2. Study of the stability of the electronic multiplier	2	4	1, 2, 3, 4	Laboratory work
3. Development of models of parallel processes	2	4	1, 2, 3, 4	Laboratory work
4. Development of models of feedback systems.	2	4	1, 2, 3, 4	Laboratory work
5. Studying and implementation of rivalry models: predator victim, arms race, etc.	2	4	1, 2, 3, 4	Laboratory work
Didactic unit: Theory of multi-agent systems, questions of its practical application when solving various applied tasks				
6. Modeling Petri control networks in systems with distributed resources.	2	4	1, 2, 3, 4	Laboratory work
7. Modeling networks of Petri systems with distributed control	2	4	1, 2, 3, 4	Laboratory work
Didactic unit: Method Monte Carlo				
8. Modeling stochastic processes by Monte Carlo	2	4	1, 2, 3, 4	Laboratory work
Didactic unit: Theory of mossary maintenance systems				
9. Modeling crisis situations in mass maintenance systems	2	4	1, 2, 3, 4	Laboratory work

Table 3.3

Themes	**Active forms, hours**	**Hours**	**Links to learning results**	**Learning activities**
Semester: 4				
Didactic unit: The main provisions of modeling theory processes and systems				

1. Evolution of the concept of the system. Properties of systems, their classification		4	1, 2, 3, 4	Expands understanding of the category system
2. Features of mathematical modeling. Computer modeling.		4	1, 2, 3, 4	Expands the understanding of the modeling category
Didactic unit: Theory of multi-agent systems, questions of its practical application when solving various applied tasks				
3. Petri Network Applications. The degree of activity of transitions in Petri nets.		4	1, 2, 3, 4	Expands the knowledge of the theory of Petri networks.
4. Simultaneousness and conflict in Petri nets. Communication of Petri networks and finite automata.		4	1, 2, 3, 4	expands the knowledge of the theory of Petri networks
Didactic unit: Method Monte Carlo				
5. Overview of Monte Carlo application applications. Normal distribution. Assigant distribution of the sum of random variables. The central limit theorem of the theory of probability.		4	1, 2, 3, 4	Expands understanding of the Monte Carlo method.
Didactic unit: Theory of mossary maintenance systems				
6. Applying mass service systems in economics and logistics. Calculation of the characteristics of the mass maintenance system with the simplest input stream.		4	1, 2, 3, 4	expands the knowledge of the theory of mass maintenance systems and its applications.

Literary sources

Main literature

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2. Зариковская, Н. В. Математическое моделирование систем : учебное пособие / Н. В. Зариковская. — Томск : Томский государственный университет систем управления и радиоэлектроники, 2014. — 168 c. — ISBN 2227-8397. — Текст : электронный // Электронно-библиотечная система IPR BOOKS : [сайт]. — URL: http://www.iprbookshop.ru/72124.html (дата обращения: 03.03.2021). — Режим доступа: для авторизир. пользователей

Internet resources

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2. http://elibrary.nstu.ru/

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Methodical support and software

Methodological support

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2. Моделирование процессов и систем : методические указания к лабораторным работам для 4 курса факультета автоматики и вычислительной техники, направлениq: 551500 - Приборостроение, 553400 - Биомедицинская инженерия, 071900 - Информационные системы и технологии / Новосиб. гос. техн. ун-т ; [сост. В. С. Пудов, А. В. Кухто]. - Новосибирск, 2005. - 30, [1] с.. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000049394

Specialized software

1 Scientific and Technical Computing Program Mathworks Matlab

2 Wednesday graphic programming means of automating NI LabVIEW

3 Creating reports for laboratory work. Microsoft Microsoft Office

4 Development of cross-platform applications Microsoft Visual Studio 2015

ANNOTATION OF THE PROGRAM

History and methodology of science and production (in electrical engineering, electromechanics and electrical technologies)

Course: 4, semester : 7

		Semester
№	**Kind of activity**	**7**
1	Total credits	4
2	Total hours	144
3	Total classes in the contact form, hours	64
4	Lectures, hours	18
5	Practical lessons, hours	0
6	Laboratory studies, hours	36
7	of them in an active and interactive form, hours	18
8	Consultations, hours	8
9	Independent work, hours	80

External requirements

is able to solve the standard tasks of professional activities on the basis of information and bibliographic culture using information and communication technologies and taking into account the basic information security requirements; ***regarding the following learning results*****:**
Know: Principles, methods and means of solving the standard tasks of professional activities based on information and bibliographic culture using information-communications technologies and taking into account the basic information security requirements.
is able to apply mathematical models, methods and means of designing information and automated systems; ***regarding the following learning results*****:**
Having skills: Simulation and design of information and automated systems
To be able to: apply mathematical models, methods and methods in practice. Means of design and automation of systems in practice.
to know: Methodology and basic methods of mathematical modeling, classification and conditions of use of models, basic methods and means of designing information and automated systems, tools modeling and designing information and automated systems.

Requirements for the results of mastering the discipline

The results of the study of the discipline	**Forms of organizing classes**
to know: Methodology and basic methods of mathematical modeling, classification and conditions of use of models, basic methods and means of designing information and automated systems, tools modeling and designing information and automated systems.	
1. To be able to apply basic knowledge in the field of information systems	Lections; Laboratory works; Independent work

To be able to: apply mathematical models, methods and methods in practice. Means of design and automation of systems in practice.	
2. Knowing ways to implement information systems	Lections; Laboratory works; Independent work
Having skills: Simulation and design of information and automated systems	
3.To be able to choose ways to implement information systems and devices	Lections; Laboratory works; Independent work
Know: Principles, methods and means of solving the standard tasks of professional activities based on information and bibliographic culture using information-communications technologies and taking into account the basic information security requirements.	
4. to be able to design simple software algorithms and implement them with modern with Reference programming	Lections; Laboratory works; Independent work
Having skills: Simulation and design of information and automated systems	
5. to be able to justify the correctness of the selected model	Lections; Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 7				
Didactic unit: General characteristics of the process of designing information systems and technologies				
1. 1 Methodological foundations of creating information systems 1.1 Basic Information Technology Design of Automated Management Systems 1.1.1 Critical analysis of the experience of designing and implementing automated control systems 1.1.2 Stages of development of automated information technologies, technical means and solved tasks 1.2 Theoretical Basics of Designing Automated Information Systems 1.2.1 Objectives and appointment 1.2.2 Structure of systems 1.2.3 Processing network design as a project management means 1.2.4 Generalized steps of creating corporate information systems		4	1, 2, 3, 4, 5	Lecture.
Didactic unit: Analysis of methods and means of information system development				

2. 2 Brief description of methods and means of developing 2.1 Individual Original Design: Status and Perspectives 2.2 Features of typical design systems 2.3 Prototype Design Systems 2.4 Case Technology 2.5 Tools of computer information technologies		4	1, 2, 3, 4, 5	Lecture.
Didactic unit: Pre-project examination and improving information technology for assurance of management activities				
3. 3 Analysis of the main types of design and pre-project work, Project documentation IP		1	1, 2, 3, 4, 5	Lecture.
Didactic unit: Improving the information system architecture				
4. 4 Design of information system architecture 4.1 Characteristics of information systems design models 4.2 Methods for designing automated control systems on the macro level		3	1, 2, 3, 4, 5	Lecture.
Didactic unit: Physical and colloidal chemistry				
5. 5 Functional and technological design of information systems 5.1 Technological Network Design Processing Tasks Management 5.2 Automation of the planning of the need for production and materials (MRP Standard) 5.2.1 Setting tasks 5.2.2 Development, analysis and description of algorithms 5.3 Improving the technology of operational management of the main production 6 Development of the Technical Project of the Information and Reference System 6.1 Stages of Functional and Technological Design 6.2 Development of a functional, information logical and algorithmic model 6.3 Development, analysis and description of algorithms 7 Prospects for the development of methods and means of design		6	1, 2, 3, 4, 5	Lecture.

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 7				

Didactic unit: Physical and colloidal chemistry				
1. Laboratory work 1. Automation of the calculation of the need for production items	8	16	1, 2, 3, 4, 5	Laboratory work. Forms practical skills for developing, analyzing and describing application software algorithms
2. Laboratory work 2. Automation of the calculation of the need for materials	2	4	1, 2, 3, 4, 5	Laboratory work. Forms practical skills for developing, analyzing and describing application software algorithms
3. Laboratory work 3. Automation of the calculation of equipment loading	8	16	1, 2, 3, 4, 5	Laboratory work. Forms practical skills for developing, analyzing and describing application software algorithms

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3. http://www.iprbookshop.ru/

4. http://znanium.com/

5. Раздобреев, М. М. Методы и средства проектирования информационных систем и технологий : электронный учебно-методический комплекс [для студентов 4 курса (7 семестр) очной формы обучения по направлению 230400 Информационные системы и технологии] / М. М. Раздобреев. – Новосибирск, [2014]. – Текст : электронный // Электронно-библиотечная система НГТУ : [сайт]. – Новосибирск, 2011– . – URL: https://elibrary.nstu.ru/source?id=44146 (дата обращения: 17.03.2021). – Режим доступа: для авторизир. пользователей.

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Methodological support

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Specialized software

1 Software Management Systems Microsoft Visual FoxPro databases

2 Application development tool (RAD) with new Microsoft Support Windows Vista and Ajax Codegear / Borland Delphi

ANNOTATION OF THE PROGRAM
Administration of information systems

Course: 4, semester : 7

		Semester
№	**Kind of activity**	**7**
1	Total credits	4
2	Total hours	144
3	Total classes in the contact form, hours	62
4	Lectures, hours	18
5	Practical lessons, hours	0
6	Laboratory studies, hours	36
7	of them in an active and interactive form, hours	16
8	Consultations, hours	6
9	Independent work, hours	82

External requirements

is able to install software and hardware for information and automated systems; ***regarding the following learning results*****:**
Know: Basics of system administration, administration of DBMS, modern standards of information interaction systems.
To be able to: perform a parametric setting of information and automated systems.
is able to choose platforms and instrumental software and hardware for the implementation of information systems; ***regarding the following learning results*****:**
Having skills: technologies and instrumental software requirements for the implementation of information systems.
To be able to: make the choice of platforms and instrumental software for the implementation of information systems, apply modern Technology implementation technologies.

Requirements for the results of mastering the discipline

The results of the study of the discipline	**Forms of organizing classes**
Know: Basics of system administration, administration of DBMS, modern standards of information interaction systems.	
1. Know the methodology for developing objects of professional activity	Lections; Laboratory works; Independent work
2.Know the basics of administration	Lections; Laboratory works; Independent work
3. innovative technologies of the industry	Lections; Laboratory works; Independent work

To be able to: perform a parametric setting of information and automated systems.	
4.Know the principles of management of the Web server	Lections; Laboratory works; Independent work
5.	Lections; Laboratory works; Independent work
To be able to: make the choice of platforms and instrumental software for the implementation of information systems, apply modern Technology implementation technologies.	
6. to know ways to maintain the operation of IP	Lections; Laboratory works; Independent work
Having skills: technologies and instrumental software requirements for the implementation of information systems.	
7. to be able to debug on commissioning	Lections; Laboratory works; Independent work
8. to be able to use the FTP server	Lections; Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 7				
Didactic unit: Basics of network administration				
1. Tasks and administration functions. Purpose of IP administration		1	1, 2, 6	Lecture.
2. Directions of administrators. Administration objects.		1	1, 2, 3	Lecture.
Didactic unit: Network level				
4. Lecture demonstrations on electrostatics.		1	2, 5	Lecture.
5. Setting up network nodes to work in TCP / IP networks.		1	2, 5	Lecture.
Didactic unit: Windows domains. Active Directory directory service				
6. Domain model of the directory service model. Domain controllers.		1	2, 3, 6	Lecture.
8. Operating system services Windows 2008 Server.		1	2, 3	Lecture.
Didactic unit: Selecting the Environmental Entry of the TPP or Boiler room.				
11. DNS zones integrated into Active Directory	3	1	2, 3	Lecture.
12. Name and dynamic node configuration services	2	1	1, 2, 3	Lecture.
Didactic unit: SQL Programming Language				
14. Installing software in the Linux family.	3	1	1, 2, 3, 7	Lecture.
15. Installing and configuring OS Linux family.	2	1	1, 2, 3, 7	Lecture.

Didactic unit: DBMS administration (MS SQL Server, MySQL)				
19. Installation and setting up DBMS.		2	1	Lecture.
20. Ensuring uninterrupted Works database servers. Reservation of data.		2	1, 2, 4	Lecture.
Didactic unit: Deploying a Web server on ra Clear platforms				
22. Administering the Web server IIS.	2	1	2, 4, 7	Lecture.
23. Evaluation of the productivity of the Web server.	2	1	2, 4, 5	Lecture.
Didactic unit: Deploying the FTP server on different platforms				
26. Preparation of the platform for installing the FTP server services.	2	1	2, 3, 4, 8	Lecture.
27. Setting access to the resources of the FTP server.		1	2, 3, 4, 8	Lecture.

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 7				
Didactic unit: Basics of network administration				
1. Network administration		4	2, 5	Lecture.
Didactic unit: Windows domains. Active Directory directory service				
2. Active Directory administration.		4	1, 2, 3, 4	Laboratory work.
Didactic unit: SQL Programming Language				
3. automatic control of technological processes on TPP, HPP and NPP. Automatic launch and stop of thermal power plants. Basic technical requirements for automatic control devices. Signal for stochastic models of linear nonstationary continuously discrete systems		4	2, 3, 7	Laboratory work.
4. Administration in networks with Windows operating systems.		4	2, 3, 7	Laboratory work.
Didactic unit: DBMS administration (MS SQL Server, MySQL)				
5. Administer databases running MS SQL (MYSQL).		8	1, 2, 3	Laboratory work.
Didactic unit: Deploying a Web server on ra Clear platforms				

6. Manage the Apache Web server.		4	2, 3, 4	Laboratory work.
Didactic unit: Deploying the FTP server on different platforms				
7. Project Communication Management.		4	1, 2, 3, 6, 7	Laboratory work.
8. Deploying the FTP server.		4	1, 2, 3, 8	Laboratory work.

Table 3.3

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 7				
Didactic unit: Windows domains. Active Directory directory service				
10. Group policies.		5	2, 3	Independent work.
Didactic unit: Selecting the Environmental Entry of the TPP or Boiler room.				
13. Planning and deploying DNS servers.		5	2, 3	Independent work.
Didactic unit: SQL Programming Language				
18. Manage users and devices. Configuring Linux OS to work in Windows networks.		10	2, 3, 7	Independent work.
Didactic unit: Deploying a Web server on ra Clear platforms				
25. Preparation of the platform to install a Web server services. Installing and configuring the Apache Web server.		10	2, 3, 4	Independent work.

Literary sources

Main literature

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6. http://znanium.com/

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Methodological support

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Specialized software

1 Operating System Microsoft Windows

2 Open Source SOCTWARE Operating System Linux Software Operating Systems

ANNOTATION OF THE PROGRAM
Basics of personal and communicative culture

в составе дисциплин: Культура научной и деловой речи

Культура и личность

Course: 1, semester : 1

		Semester
№	**Kind of activity**	**1**
1	Total credits	3
2	Total hours	108
3	Total classes in the contact form, hours	66
4	Lectures, hours	18
5	Practical lessons, hours	36
6	Laboratory studies, hours	0
7	of them in an active and interactive form, hours	16
8	Consultations, hours	10
9	Independent work, hours	42

Literary sources

Internet resources

1. http://elibrary.nstu.ru/

2. https://e.lanbook.com/

3. http://www.iprbookshop.ru/

4. http://znanium.com/

ANNOTATION OF THE PROGRAM
Scientific and business speech culture

Course: 1, semester : 1

		Semester
№	**Kind of activity**	**1**
1	Total credits	1,5
2	Total hours	54
3	Total classes in the contact form, hours	31
4	Lectures, hours	8
5	Practical lessons, hours	18
6	Laboratory studies, hours	0
7	of them in an active and interactive form, hours	8
8	Consultations, hours	5
9	Independent work, hours	23

External requirements

is able to carry out social interaction and implement its role in the command; ***regarding the following learning results*****:**
to know: the main techniques and norms of social interaction; Basic concepts and methods of conflictology, interpersonal and group communication technologies in business interaction.
is able to carry out business communication in oral and written forms in the state language of the Russian Federation and foreign language (AH); ***regarding the following learning results*****:**
to be able to: apply in practice business communication in oral and writing forms, methods and skills of business communication in Russian and foreign languages.
to know: the principles of building an oral and written statement in Russian and foreign yaz sir; Rules and patterns of business oral and written communication.
to own: the skills of reading and transferring texts in a foreign language in professional communications; skills of business communications in oral and writing in Russian and foreign languages; The methodology for compiling a judgment in interpersonal business communication in Russian and foreign languages.

Requirements for the results of mastering the discipline

The results of the study of the discipline	**Forms of organizing classes**
to know: the main techniques and norms of social interaction; Basic concepts and methods of conflictology, interpersonal and group communication technologies in business interaction.	
1. UK-3. 1 1. Know: The main techniques and norms of social interaction; Basic concepts and methods of conflictology, interpersonal and group communication technologies in business interaction.	Lections; Seminars; Independent work

to know: the principles of building an oral and written statement in Russian and foreign yaz sir; Rules and patterns of business oral and written communication.	
2. UK-4. 1 1. To know: the principles of building an oral and written statement in Russian and foreign languages; Rules and patterns of business oral and written communication.	Lections; Seminars; Independent work
to be able to: apply in practice business communication in oral and writing forms, methods and skills of business communication in Russian and foreign languages.	
3. UK-4. 2 2. To be able to: apply in practice business communication in oral and written forms, methods and skills of business communication in Russian and foreign languages.	Lections; Seminars; Independent work
to own: the skills of reading and transferring texts in a foreign language in professional communications; skills of business communications in oral and writing in Russian and foreign languages; The methodology for compiling a judgment in interpersonal business communication in Russian and foreign languages.	
4. UK-4. 3 3. To own: the skills of reading and translating texts in a foreign language in professional communication; skills of business communications in oral and writing in Russian and foreign languages; Methodology for the preparation of judgment in interpersonal business communication in Russian and foreign languages.	Lections; Seminars; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 1				
Didactic unit: Culture of speech				
1. Russian in the cultural and historical space of the XX-XXI centuries. The state of speech culture of society at the present stage.		2	1, 2, 3, 4	Lecture. Suiting the abstract lecture. Participation in the discussion part of the lecture. Performing creative tasks.
2. The normative aspect of the speech culture of a specialist.		2	1, 2, 3, 4	Lecture. Suiting the abstract lecture. Participation in the discussion part of the lecture. Performing creative tasks.
Didactic unit: Stylistics				
4. Scientific speech as a component of the training and professional activities of students.		1	1, 2, 4	Lecture. Suiting the abstract lecture.
5. Business speech as a component of the professional activity of a specialist. Etiquette of a business letter.		1	1, 2, 3, 4	Lecture. Suiting the abstract lecture.
Didactic unit: Rhetoric				
7. Basics of public speech. Speech academic etiquette. Features of the culture of scientific communication.		1	1, 2, 3, 4	Lecture. Suiting the abstract lecture.

8. etiquette of business conversations. Features of the device to work.		1	1, 2, 3, 4	Lecture. Suiting the abstract lecture. Participation in the discussion part of the lecture. Performing creative tasks.

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 1				
Didactic unit: Culture of speech				
1. Language and speech. National language: non-vertical forms and functional styles.	2	2	1, 2, 4	Practical lesson. Deal in the texts of non-Lectureny forms of the National Language: Purchase, Argo, Slang, Dialect.
2. Theory of norms. Orphoepic, lexical, grammatical, stylistic rules of Shrill.		4	1, 2, 3, 4	Practical lesson. Estimates with messages about one of the types of national language (message scheme: definition, properties, examples, use sphere). Analysis of examples (words, phrases) with orthoepic difficulties. Performing tasks for orthoepic and grammatical standards. Working with a table of thermal elements.
Didactic unit: Stylistics				
5. Normal system of differential equations. Theorem of existence and uniqueness. Normal linear system of differential equations. General solution of a linear homogeneous system. Linear inhomogeneous system. Linear equation of N-th order. Reducing the order of a linear homogeneous system of differential equations	4	4	1, 2, 4	Practical activity. Text-making, drawing up question and popular plans. Identify errors in science-style texts. Performances with reports on the topic of the found scientific article.
6. Genres of written business communication. Statement. Explanatory note. Summary upon admission to work.		4	1, 2, 3, 4	Practical lesson. Business securities. Writing Summary.
Didactic unit: Rhetoric				
7. Oral scientific and educational conference. Refstract message accompanied by electronic presentation.	2	2	1, 2, 4	Practical occupation. Suggestions with reports accompanied by electronic presentation.
10. Genres of oral business communication. Interview with the device to work.		2	1, 2, 3, 4	Practical occupation. Intelligence in business negotiations. Performances with reports on "Intercultural Communication in Business Sphere".

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Main literature

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Methodological support

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Specialized software

1 Calculator of the cost and timing of the project and its stages according to the COCOMO COCOMO® II.2000.4 methodology

2 Microsoft Office Application Pack

ANNOTATION OF THE PROGRAM
Culture and personality

Course: 1, semester : 1

		Semester
№	**Kind of activity**	**1**
1	Total credits	1,5
2	Total hours	54
3	Total classes in the contact form, hours	31
4	Lectures, hours	8
5	Practical lessons, hours	18
6	Laboratory studies, hours	0
7	of them in an active and interactive form, hours	8
8	Consultations, hours	5
9	Independent work, hours	23

External requirements

is able to determine the range of tasks in the framework of the target and choose the best ways to solve them, based on existing legal norms, resources available and restrictions; *regarding the following learning results*:
to be able to: conduct an analysis of the goal and formulate the tasks that need to be solved to achieve it; analyze alternative options to achieve the outlined results; Use regulatory documentation in the field of professional activity.
is able to carry out social interaction and implement its role in the command; *regarding the following learning results*:
is able to perceive the intercultural diversity of society in socio-historical ohm, ethical and philosophical contexts; *regarding the following learning results*:
has practical experience in analyzing philosophical and historical facts, the experience of assessing cultural phenomena.
knows how to communicate with representatives of other nationalities and denominations in compliance with ethical and intercultural norms.
knows the main categories of philosophy, the laws of historical development, the basics of intercultural communication.
is able to manage their time, build and implement a self-development trajectory based on the principles of education throughout life; *regarding the following learning results*:
to know: the main techniques of effective management of own time; The main methods of self-control, self-development and self-education throughout the life

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes
to be able to: conduct an analysis of the goal and formulate the tasks that need to be solved to achieve it; analyze alternative options to achieve the outlined results; Use regulatory documentation in the field of professional activity.	
1. UK-2. 2 2. To be able to: carry out the analysis of the goal and formulate the tasks that need to be solved to achieve it; analyze alternative options to achieve the outlined results; Use regulatory and legal documentation in the field of professional activity.	Seminars; Independent work
2. UK-4. 1 1. To be able to communicate in a foreign language in typical situations of academic communication.	Seminars; Independent work
knows the main categories of philosophy, the laws of historical development, the basics of intercultural communication.	
3. UK-5. 1 1. Know the main categories of philosophy, the laws of historical development, the basics of intercultural communication.	Lections; Seminars; Independent work
knows how to communicate with representatives of other nationalities and denominations in compliance with ethical and intercultural norms.	
4. UK-5. 2 2. Conditions to communicate with representatives of other nationalities and denominations in compliance with ethical and intercultural norms.	Lections; Seminars; Independent work
has practical experience in analyzing philosophical and historical facts, the experience of assessing cultural phenomena.	
5. UK-8. 3 3. Owns the victim first aid skills.	Seminars; Independent work
to know: the main techniques of effective management of own time; The main methods of self-control, self-development and self-education throughout the life	
6. UK-6. 1 1. Know: Basic techniques to effectively manage your own time; The main methods of self-control, self-development and self-education throughout the life of	Lections; Seminars; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 1				
Didactic unit: Communicative and sociocultural aspects of personality formation in the professional and business sector				
1. Personality and Basics of intercultural communication		2		Lecture with elements of "brainstorming". Analysis of the concepts of "culture" and "personality".

2. Humanistic ideals and values ??in personality formation		2	3, 4	Lecture with elements of the discussion. Students are offered a number of problem situations. Lisviar versions of students. Their theoretical interpretus is given by the teacher.
3. Intellectual human development in culture		2	3	Lecture with elements of "brainstorming". The issues of interaction of intellectual and business activity in the professional sphere are discussed. The question of the need for fundamental theoretical preparation within the framework of profile specialization is discussed.
4. Personal self-determination in modern culture		2	4, 6	Lecture with a demonstration of video phrases. Joint discussion and interpretation of visual content, reflecting the nature and problems of modern cultural development.

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 1				
Didactic unit: Communicative and sociocultural aspects of personality formation in the professional and business sector				
1. Personality and Society: Socialization Problems		2	2	Seminar conversation, including the self-testing of students and teachers (acquaintance), analyzing self-testing from the point of view of the demonstration of psychological, behavioral, social features. Practical study of the methods of conducting such an analysis by students themselves.
2. Personality and modern mass communications. .	1	2	2, 4	A problem seminar with a discussion of film films, excerpts from artistic and scientific works characterizing the state of personality in the context of modern communications.
3. Features of ritual-mythological communication.	1	2	2	analysis of the fragments of artistic texts, video materials (commercials, etc.) using various ritual and mythological elements

4. Value aspects of personality development: confessional and moral aspects of behavior in the business and professional sphere	1	2	2, 3, 4, 5	Problem seminar on the material of the history of ethical thought. Discussing the specifics of the formation and development of humanistic ideals in various sides of cultural life. Threads for work in mini-groups: "Craftsman and engineer: Humanistic and antigumanist trends in traditional and industrial production."
5. Culture and rationality. Analytical and reflexive personality formation skills.	1	2	1, 3, 6	Problem seminar with elements of the role-playing historical game "Court of Socrates", in the process of which the differences between traditional and rational thinking are found, the methods of argumentation and counterpressure are established in a public dispute .
6. Labor ethics. The problem of motivating work in the professional field	1	2	4, 5	The problem seminar that detects spiritual and moral aspects of the capitalist society (modern). Discussion and interpretation of scientific and artistic texts.
7. Professional engineer culture.	1	2	4, 5	Discussing various technical achievements in the history of culture. Motivate students to actively master the history of technology. Audience is offered a number of discussion issues on the topic: "Problems and Prospects for Technical Progress."
8. Scientific and technical creativity in the history of culture.	1	2	3, 4, 5	Discussing various technical achievements in the history of culture. Motivate students to actively master the history of technology. Audience is offered a number of discussion issues on the topic: "Problems and Prospects for Technical Progress."
9. Problems of human development and future technology.	1	2	2, 4, 5	Discussing various technical achievements in the history of culture. Motivate students to actively master the history of technology. Audience is offered a number of discussion issues on the topic: "Problems and Prospects for Technical Progress."

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Main literature

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Methodical support and software

Methodological support

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Specialized software

1 Calculator of the cost and timing of the project and its stages according to the COCOMO COCOMO® II.2000.4 methodology

2 Microsoft Office Application Pack

ANNOTATION OF THE PROGRAM
Psychology and technology of social interaction

в составе дисциплин: Социальные технологии

Организационная психология

Course: 2, semester : 4

		Semester
№	**Kind of activity**	**4**
1	Total credits	3
2	Total hours	108
3	Total classes in the contact form, hours	66
4	Lectures, hours	18
5	Practical lessons, hours	36
6	Laboratory studies, hours	0
7	of them in an active and interactive form, hours	40
8	Consultations, hours	10
9	Independent work, hours	42

Table 3.1

Themes	**Active forms, hours**	**Hours**	**Links to learning results**	**Learning activities**
Semester: 4				
Didactic unit: Conflict management technologies				
1. Conflict: Concept, types, conflict dynamics		2	2	Students listen to the lecture and make up the cospure of the following sections: the concept of conflict, conflict typology, causes of conflict, conflict dynamics
2. Conflict resolution		1	2	
3. Negotiations as a way to resolve the conflict		2	2	Students listen to the lecture and make up the cospure of the following sections: the concept of negotiations, types and features of the negotiations, the stages of the negotiation process
Didactic unit: Socio-project technologies				

4. Written genres of scientific and educational speech. Abstract, abstract, course and bachelor work.	1	1	1, 2	Students listen to the lecture and make up the cospate in the following sections: the concept of a social project, the project cycle, Designing in the resolution of social problems, stages of project activities
5. Fundraising as a stage of project activities	1	1	1, 2	Students listen to the lecture and make up the cospite in the following sections: the concept of fundraising, motivation of activity
6. Presentation of performance results	1	1	1, 2, 4	Students listen to a lecture and make up the cosptext to the following sections: a presentation of the unitual and group activities

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 4				
Didactic unit: Conflict management technologies				
1. conflict function	1	1	2, 3	Students work in subgroups, identify the positive and negative conflict functions, participate in group discussion
2. Strategies of behavior in conflict	1	1	2, 3, 4	Students study strategies for behavior in conflict on the example of Thomas Killman's mesh -Killman to determine his own dominant strategy
3. Conflict analysis	2	2	2, 4	Students lead a summary, propose methods of braking electric drive
4. Features of the group conflict	3	3	2, 3, 4	Game "shipwreck", group discussion on the results of the game
5. Negotiations	5	5	2, 3, 4	game "Dert and Balda", testing the technician of the negotiation process
Didactic unit: Socio-project technologies				
6. Social project	1	1	1, 2	Discussion of social problems of society and group, allocation of problems for writing a social project
7. Group and individual activity planning	1	1	1	Students develop a section of the social project "Stages and events"
8. Fundraising	1	1	1, 2	Group discussion "Search and attracting resources"
9. Presentation of activities	1	1	1, 2, 4	Game "Interview", game "Presentation of us"

10. Protecting the project	1	2	1, 2, 4	Students will present and protect social projects

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Main literature

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ANNOTATION OF THE PROGRAM

Social technologies

Course: 2, semester : 4

		Semester
№	**Kind of activity**	**4**
1	Total credits	1,5
2	Total hours	54
3	Total classes in the contact form, hours	31
4	Lectures, hours	8
5	Practical lessons, hours	18
6	Laboratory studies, hours	0
7	of them in an active and interactive form, hours	20
8	Consultations, hours	5
9	Independent work, hours	23

External requirements

is able to determine the range of tasks in the framework of the target and choose the best ways to solve them, based on existing legal norms, resources available and restrictions; *regarding the following learning results*:
to be able to: conduct an analysis of the goal and formulate the tasks that need to be solved to achieve it; analyze alternative options to achieve the outlined results; Use regulatory documentation in the field of professional activity.
is able to carry out social interaction and implement its role in the command; *regarding the following learning results*:
own: the simplest methods and techniques of social interaction and work in the team.
to know: the main techniques and norms of social interaction; Basic concepts and methods of conflictology, interpersonal and group communication technologies in business interaction.

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes
to be able to: conduct an analysis of the goal and formulate the tasks that need to be solved to achieve it; analyze alternative options to achieve the outlined results; Use regulatory documentation in the field of professional activity.	
1. UK-2. 2 2. To be able to: carry out the analysis of the goal and formulate the tasks that need to be solved to achieve it; analyze alternative options to achieve the outlined results; Use regulatory and legal documentation in the field of professional activity.	Lections; Seminars; Independent work
to know: the main techniques and norms of social interaction; Basic concepts and methods of conflictology, interpersonal and group communication technologies in business interaction.	

2. UK-3. 1 1. Know: The main techniques and norms of social interaction; Basic concepts and methods of conflictology, interpersonal and group communication technologies in business interaction.	Lections; Seminars; Independent work
3. UK-4. 1 1. To be able to communicate in a foreign language in typical situations of academic communication.	Seminars; Independent work
own: the simplest methods and techniques of social interaction and work in the team.	
4. UK-3. 3 3. To own: the simplest methods and techniques of social interaction and work in the team.	Lections; Seminars; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 4				
Didactic unit: Conflict management technologies				
1. Conflict: Concept, types, conflict dynamics		2	2	Students listen to the lecture and make up the cospure of the following sections: the concept of conflict, conflict typology, causes of conflict, conflict dynamics
2. Conflict resolution		1	2	
3. Negotiations as a way to resolve the conflict		2	2	Students listen to the lecture and make up the cospure of the following sections: the concept of negotiations, types and features of the negotiations, the stages of the negotiation process
Didactic unit: Socio-project technologies				
4. Written genres of scientific and educational speech. Abstract, abstract, course and bachelor work.	1	1	1, 2	Students listen to the lecture and make up the cospate in the following sections: the concept of a social project, the project cycle, Designing in the resolution of social problems, stages of project activities
5. Fundraising as a stage of project activities	1	1	1, 2	Students listen to the lecture and make up the cospite in the following sections: the concept of fundraising, motivation of activity
6. Presentation of performance results	1	1	1, 2, 4	Students listen to a lecture and make up the cosptext to the following sections: a presentation of the unitual and group activities

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities

Semester: 4				
Didactic unit: Conflict management technologies				
1. conflict function	1	1	2, 3	Students work in subgroups, identify the positive and negative conflict functions, participate in group discussion
2. Strategies of behavior in conflict	1	1	2, 3, 4	Students study strategies for behavior in conflict on the example of Thomas Killman's mesh -Killman to determine his own dominant strategy
3. Conflict analysis	2	2	2, 4	Students lead a summary, propose methods of braking electric drive
4. Features of the group conflict	3	3	2, 3, 4	Game "shipwreck", group discussion on the results of the game
5. Negotiations	5	5	2, 3, 4	game "Dert and Balda", testing the technician of the negotiation process
Didactic unit: Socio-project technologies				
6. Social project	1	1	1, 2	Discussion of social problems of society and group, allocation of problems for writing a social project
7. Group and individual activity planning	1	1	1	Students develop a section of the social project "Stages and events"
8. Fundraising	1	1	1, 2	Group discussion "Search and attracting resources"
9. Presentation of activities	1	1	1, 2, 4	Game "Interview", game "Presentation of us"
10. Protecting the project	1	2	1, 2, 4	Students will present and protect social projects

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Specialized software

1 Microsoft Windows operating system

2 Microsoft Office Application Pack

ANNOTATION OF THE PROGRAM
Pedagogy of higher school

Course: 2, semester : 4

		Semester
№	**Kind of activity**	**4**
1	Total credits	1,5
2	Total hours	54
3	Total classes in the contact form, hours	31
4	Lectures, hours	8
5	Practical lessons, hours	18
6	Laboratory studies, hours	0
7	of them in an active and interactive form, hours	20
8	Consultations, hours	5
9	Independent work, hours	23

External requirements

is able to carry out social interaction and implement its role in the command; ***regarding the following learning results*****:**
own: the simplest methods and techniques of social interaction and work in the team.
is able to manage their time, build and implement a self-development trajectory based on the principles of education throughout life; ***regarding the following learning results*****:**
own: methods of managing their own time; technology acquisition, use and updating sociocultural and professional knowledge, skills and skills; Methods of self-development and self-education throughout life.
To be able to: Effectively plan and control your own time; Use the methods of self-regulation, self-development and self-study.
to know: the main techniques of effective management of own time; The main methods of self-control, self-development and self-education throughout the life

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes
1. UK-4. 1 1. To be able to communicate in a foreign language in typical situations of academic communication.	Lections; Seminars; Independent work
own: the simplest methods and techniques of social interaction and work in the team.	
2. UK-3. 3 3. To own: the simplest methods and techniques of social interaction and work in the team.	Lections; Seminars; Independent work

to know: the main techniques of effective management of own time; The main methods of self-control, self-development and self-education throughout the life	
3. UK-6. 1 1. Know: Basic techniques to effectively manage your own time; The main methods of self-control, self-development and self-education throughout the life of	Lections; Seminars; Independent work
To be able to: Effectively plan and control your own time; Use the methods of self-regulation, self-development and self-study.	
4. UK-6. 2 2. To be able to: Effectively plan and control your own time; Use the methods of self-regulation, self-development and self-education.	Lections; Seminars; Independent work
own: methods of managing their own time; technology acquisition, use and updating sociocultural and professional knowledge, skills and skills; Methods of self-development and self-education throughout life.	
5. UK-6. 3 3. Own: methods of managing their own time; technology acquisition, use and updating sociocultural and professional knowledge, skills and skills; Methods of self-development and self-education throughout life.	Lections; Seminars; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 4				
Didactic unit: Sent and interaction				
1. Concept of communication; Functions, parties, communication styles	0	2	1, 2, 5	Students make a summary of lecture material and receive answers to the questions asked by the teacher on the topic of lectures
2. Features of the perception of another person in the process of communication	2	2	1, 2, 5	Students make an abstract on lecture material, answer the teacher's questions during the lecture, provide examples
Didactic unit: Teamwork				
3. The concept of the team, characteristic of the work team	0	2	1, 2	Students make a summary of lecture material and receive answers to the questions asked by the teacher on the topic of lectures
Didactic unit: Self-knowledge and self-development				
4. Self-organization and self-motive	1	2	3, 4, 5	Students make an abstract on lecture material, answer the teacher's questions during the lecture, provide examples

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 4				
Didactic unit: Sent and interaction				

1. The concept of verbal and non-verbal communication	2	2	1, 2	Students perform exercises to transfer verbal and non-verbal information. The following questions are discussed in the dialogue mode: non-verbal communication systems; cultural features of manifestation of non-verbal communication; the causes of the difficulties of understanding of non-verbal communication and the ways to overcome them; Distortion of information in the process of communication.
2. Barriers of communication and methods for overcoming	2	2	1, 2	The following questions are discussed in the dialogue mode: the concept of communication barriers; Types of barriers and ways to overcome them. Students lead examples of communicative barriers.
Didactic unit: Teamwork				
3. Roles in the team	2	2	1, 2	Diagnosis of command roles according to the method of R.M. Belbina. Studying role characteristics. Discussion of the dependence of the team's efficiency from its composition.
4. Group phenomena and effects	2	2	1, 2	In the dialogue mode, the following questions are discussed: phenomena arising in teamwork; Factors leading to group phenomena; Ways to reduce the negative impact of group phenomena on the activities of the team.
5. Interaction in the team	1	1	1, 2	Students perform a command job, and then analyzed: - its behavior in the group; - What group phenomena and effects manifested themselves in teamwork; - how representatives of different command roles showed themselves.
Didactic unit: Self-knowledge and self-development				

6. Time management	2	2	3, 4	In the dialogue mode, the following questions are studied: The basic concepts of time management; techniques and taking time management; The concept of individual style of activity. Students analyze personal temporary losses, determine the methods of increasing their effectiveness.
7. Basics of self-sustaining	2	2	1, 2, 3, 5	The types and objectives of the self-testing are discussed. It is studied by a summary as a form of self-testing: rules and typical errors when it is compiled. The specificity of self-testing in employment is discussed.
8. Diagnosis of individual characteristics	4	5	1, 2, 3, 4, 5	in the dialogue mode, the following questions are studied: concept of character and temperament; typology of character and temperament; Temperament as the basis of an individual activity style. The diagnosis of character and temperament is carried out (according to one of the techniques: D.Kayirsi, K.leongard-N.Shimisek, Aisenka).

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Specialized software

1 Microsoft Windows operating system

ANNOTATION OF THE PROGRAM

Economics and management of industrial systems

в составе дисциплин: Экономика предприятия

Управление производственными системами

Course: 3, semester : 6

		Semester
№	**Kind of activity**	**6**
1	Total credits	3
2	Total hours	108
3	Total classes in the contact form, hours	80
4	Lectures, hours	36
5	Practical lessons, hours	36
6	Laboratory studies, hours	0
7	of them in an active and interactive form, hours	0
8	Consultations, hours	6
9	Independent work, hours	28

Literary sources

Internet resources

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2. https://e.lanbook.com/

3. http://www.iprbookshop.ru/

4. http://znanium.com/

ANNOTATION OF THE PROGRAM

Engineering graphics

Course: 3, semester : 6

		Semester
№	**Kind of activity**	**6**
1	Total credits	1,5
2	Total hours	54
3	Total classes in the contact form, hours	39
4	Lectures, hours	18
5	Practical lessons, hours	18
6	Laboratory studies, hours	0
7	of them in an active and interactive form, hours	0
8	Consultations, hours	3
9	Independent work, hours	15

External requirements

is able to determine the range of tasks in the framework of the target and choose the best ways to solve them, based on existing legal norms, resources available and restrictions; *regarding the following learning results*:
own: methods of developing the goal and objectives of the project; methods for assessing the need for resources, duration and cost of the project; Skills of working with regulatory legal documentation.

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes
own: methods of developing the goal and objectives of the project; methods for assessing the need for resources, duration and cost of the project; Skills of working with regulatory legal documentation.	
1. Know the economic categories, concepts, indicators and interrelations between them and their impact on the effectiveness of the production and financial activities of the enterprise	Lections; Seminars; Independent work
2. To be able to apply the methods of determining the need (in accordance with the objectives of the enterprise) and the valuation of various (labor, technical and material and material) resources of the enterprise and the indicators of their use	Lections; Seminars; Independent work
3. to know approaches to the formation of production costs for the manufacture of products (works, Services) and obtaining the results of the activities of the enterprise (organization)	Lections; Seminars; Independent work
4. to be able to determine and analyze the financial performance of the enterprise and its effectiveness	Lections; Seminars; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results
Semester: 6			
Didactic unit: Economy of the enterprise			
1. Enterprise resources: fixed assets of the enterprise	0	4	2
2. Resources of the enterprise: working capital	0	3	2
3. Enterprise Resources: Labor Resources	0	3	2
4. Estimation of the costs and results of the enterprise	0	4	3, 4
5. Investments and their estimate	0	2	3, 4
6. Economic foundations of the functioning of the enterprise	0	2	1

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 6				
Didactic unit: Economy of the enterprise				
1. Fixed assets of the enterprise	0	4	1, 2	solving problems. Test tasks (http://dispace.edu.nstu.ru/didesk/course/show/3277/tests). Strengthening practical problems
2. Redeems of the enterprise	0	2	2	solving problems. Test tasks (http://dispace.edu.nstu.ru/didesk/course/show/3277/tests). Strengthening practical problems
3. Labor resources of the enterprise	0	2	2	solving problems. Test tasks (http://dispace.edu.nstu.ru/didesk/course/show/3277/tests). Strengthening practical problems
4. labor productivity and wages	2	2	2	Solution of the tasks.
5. cost price and product price (works, services)	4	4	3, 4	Solution of the tasks.
6. The results of the enterprise.	0	2	3, 4	solving problems. Test tasks (http://dispace.edu.nstu.ru/didesk/course/show/3277/tests). Strengthening practical problems
7. Evaluation of investments	0	2	3, 4	Solution of the tasks.

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Methodical support and software

Methodological support

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Specialized software

Использование специализированного программного обеспечения для изучения дисциплины не требуется

ANNOTATION OF THE PROGRAM
Managing production systems

Course: 3, semester : 6

		Semester
№	**Kind of activity**	**6**
1	Total credits	1,5
2	Total hours	54
3	Total classes in the contact form, hours	39
4	Lectures, hours	18
5	Practical lessons, hours	18
6	Laboratory studies, hours	0
7	of them in an active and interactive form, hours	0
8	Consultations, hours	3
9	Independent work, hours	15

External requirements

is able to determine the range of tasks in the framework of the target and choose the best ways to solve them, based on existing legal norms, resources available and restrictions; ***regarding the following learning results*****:**
own: methods of developing the goal and objectives of the project; methods for assessing the need for resources, duration and cost of the project; Skills of working with regulatory legal documentation.

Requirements for the results of mastering the discipline

The results of the study of the discipline	**Forms of organizing classes**
own: methods of developing the goal and objectives of the project; methods for assessing the need for resources, duration and cost of the project; Skills of working with regulatory legal documentation.	
1. to know the foundations of modern Concepts of management of production systems in the conditions of the market	Lections; Seminars; Independent work
2. to know Project certification rules	Lections; Seminars; Independent work
3. Know Principles for the organization of jobs, their technical equipment, equipment, automation, management and control tools	Lections; Seminars; Independent work
4. Systems of quality management of products and processes	Lections; Seminars; Independent work
5. To be able to analyze the production and temporary costs of ensuring the required quality of products and processes, the results of the operating activities of production units	Lections; Seminars; Independent work

6. to know the principles of the development process, adoption, organization of execution of management decisions	Lections; Seminars; Independent work
7. To be able to develop and make management solutions based on economic calculations	Lections; Seminars; Independent work
8. To be able to carry out activities related to the management of individual employees and their work in a team	Lections; Seminars; Independent work
9. to be able to develop the objectives of the project (about grams), tasks for given criteria, target functions, restrictions, develop the structure of their relationships, to determine the priorities of solving problems	Lections; Seminars; Independent work
10. to know the approaches and principles of the organization of work on the examination and reengineering of business processes of industrial enterprises	Lections; Seminars; Independent work
11. To be able to programmatically implement the main algorithms of raster and vector graphics	Lections; Seminars; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 6				
Didactic unit: Managing Production Systems				
1. Embossing of liquids from holes and nozzles. Cavitation.	0	2	1	Lecture using multimedia techniques. Drawing up a brief abstract lectures with examples and explanations.
2. Basics of the organization of the production process.	0	4	10, 2	Lecture using multimedia techniques. Drawing up a brief abstract lectures with examples and explanations.
3. Organizational structure of the manufacturing enterprise.	0	2	6, 8, 9	Lecture using multimedia techniques. Drawing up a brief abstract lectures with examples and explanations.
4. Production types.	0	2	3	Lecture using multimedia techniques. Drawing up a brief abstract lectures with examples and explanations.
5. Production planning.	0	4	2, 5	Lecture using multimedia techniques. Drawing up a brief abstract lectures with examples and explanations.
6. Automated enterprise management systems.	0	2	4, 6	Lecture using multimedia techniques. Drawing up a brief abstract lectures with examples and explanations.

7. Financial indicators for making management decisions.	0	2	11, 6, 7	Lecture using multimedia techniques. Drawing up a brief abstract lectures with examples and explanations.

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 6				
Didactic unit: Managing Production Systems				
1. Analysis of production media and processes.	1	4	1, 9	Working with Case. Group discussion of the results of work performed.
2. Development of management solutions for different production environments.	2	4	1, 6, 7	Working with a simulator. Group discussion of the results of completed work.
3. Types of movement of labor items.	1	2	2, 3, 5	solving problems. Group discussion of questions on the topic.
4. Initial positions and analysis of the reliability of distribution device circuit breakers	1	4	10, 2, 3, 4, 5, 8	Working with Case. Group discussion of the results of work performed.
5. Economic substantiation of investment in the development of production.	1	4	11, 9	solving problems. Group discussion of questions on the topic.

Table 3.3

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 6				
Didactic unit: Managing Production Systems				
1. Basics of modern management of production systems.		4	1	Analysis of information and literary sources.
2. Economic substantiation of investment in the development of production.		1	10, 11	Analysis of information and literary sources.
3. Economic and mathematical modeling.		1	10, 11	Analysis of information and literary sources.

Literary sources

Main literature

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2. Отраслевая структура современного менеджмента: учебник/ под ред. проф. М.М. Максимцова, проф. В.Я. Горфинкеля.— М.: Вузовский учебник: ИНФРА-М, 2018. — 320с. - ISBN 978-5-9558-0166-7. - Текст : электронный. - URL: https://znanium.com/catalog/product/929683 (дата обращения: 22.02.2021). – Режим доступа: по подписке. - Режим доступа: https://znanium.com/catalog/document?id=372252 - Загл. с экрана.

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5. Власов, М. П. Оптимальное управление экономическими системами : учеб. пособие / М.П. Власов, П.Д. Шимко. — М. : ИНФРА-М, 2018. — 312 с. + Доп. материалы [Электронный ресурс; Режим доступа http://www.znanium.com]. — (Высшее образование: Бакалавриат). - ISBN 978-5-16-005426-1. - Текст : электронный. - URL: https://znanium.com/catalog/product/923355 (дата обращения: 22.02.2021). – Режим доступа: по подписке. - Режим доступа: https://znanium.com/catalog/document?id=372419 - Загл. с экрана.

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Methodical support and software

Methodological support

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Specialized software

1 Microsoft Office Application Pack

2 Microsoft Windows operating system

ANNOTATION OF THE PROGRAM
Electronics

Course: 2, semester : 4

		Semester
№	**Kind of activity**	**4**
1	Total credits	4
2	Total hours	144
3	Total classes in the contact form, hours	81
4	Lectures, hours	36
5	Practical lessons, hours	0
6	Laboratory studies, hours	36
7	of them in an active and interactive form, hours	8
8	Consultations, hours	7
9	Independent work, hours	63

External requirements

The ability to conduct research at all stages of the software product life cycle; *regarding the following learning results*:
have the completion skills in accordance with the task received
is able to search, critical analysis and synthesis of information, apply a systematic approach to solving the set Tasks; *regarding the following learning results*:
To be able to: apply search, collection and information processing techniques; Creit analysis and synthesis of information obtained from different sources; Apply the system approach to solve the tasks set.

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes
have the completion skills in accordance with the task received	
1. Have experience of calculating, assembling and adjusting the scheme on operating amplifiers: large-scale amplifiers, differential amplifiers; Repeators, current sources, generators of harmonic and rectangular signals.	Laboratory works; Independent work
2. To be able to analyze the error of the final version of the schemes.	Laboratory works; Independent work
3. to be able to analyze the noise immunity of the schemes and analyze the effect of destabilizing factors, such as temperature and pulsation of food to the accuracy of the schemes.	Laboratory works; Independent work
4. Be able to independently design electronic measuring devices, conduct experimental studies, configure electronic equipment.	Laboratory works; Independent work

To be able to: apply search, collection and information processing techniques; Creit analysis and synthesis of information obtained from different sources; Apply the system approach to solve the tasks set.	
5. To know about the analysis and network management tools and managing	Lections; Laboratory works; Independent work
6. to know the schemes of matching, gain and convert the measured signals. What methods (analog or digital) should be used depending on the required conversion accuracy.	Lections; Laboratory works; Independent work
7. Know the device and the operation of the main elements of the electrical circuits.	Lections; Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 4				
Didactic unit: Elemental Base of electronic devices. Passive elements of electronic chains				
1. Resistors. Permanent and variables, nominal row, temperature coefficient of resistance, power. Voltage divisors on resistors.		2	5, 7	Lecture.
2. Capacitors of steam turbines		2	5, 7	Lecture.
Didactic unit: Principles of design of the electrical part of rolling stock.				
3. Volt-ampere characteristics (VAH) P-n transition. Properties of semiconductor diodes. Temperature characteristics. Rectifiers.		4	5, 7	Lecture.
4. Varieties Diodes (Schottky diodes, PIN diodes, varicaps). Stabilians. Parametric voltage stabilizer.		4	5, 7	Lecture.
Didactic unit: Transistors				
5. Field transistors, device and operation of transistors with a control P-N-transition and an isolated shutter. The main parameters and characteristics. Inclusion schemes. Permanent operation mode.		4	5, 7	Lecture.
8. Bipolar transistors, device, characteristics, operation modes. Equivalent diagram in a small signal mode.		4	5, 7	Lecture.
Didactic unit: Linear transducers of electrical signals. Amplifiers				

4. Principle of operation of the amplifier. Amplifier on the field transistor. A amplifier on a bipolar transistor. Main parameters: amplification coefficient, input and output resistance, amplitude-frequency response; Phase-frequency characteristic.		4	5, 6, 7	Lecture.
Didactic unit: Operating amplifiers (OU)				
5. Operational amplifier circuitry - differential cascade, level shift cascade, power amplifier. Basic OU Parameters: Repair Coefficient, Displacement EMP, Input Toki, Single Strength Frequency, Output Voltage Ratings, Output Resistance, Size Remote Signal Coefficient, OU Temperature Specifications, OU frequency characteristics. Inverting amplifier, voltage repeater. The impact of the instability of OU parameters on the error of amplifiers. Differential amplifier on three OU. Execution of mathematical operations on the OU: Summirov, subtraction, differentiation, integration, logarithmation. Sources of secondary power supply: Current sources, voltage strokes. Active filters, generators of electrical signals, harmonic generators. Nonlinear signal converters: keys, limiters, logical (boolean) functions. Logic elements. Combinational and sequence diagrams. Rectangular IMP	2	8	5, 6, 7	Lecture.
7. Operating amplifiers (OU). Specifications. The effect of temperature on the OU parameters. Frequency characteristics OU. Noises amplifiers. Noise rationing. Measuring amplifiers.		4	6, 7	Lecture.

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 4				
Didactic unit: Principles of design of the electrical part of rolling stock.				
1. Parametric voltage stabilizer.	2	6	1, 2, 3, 4, 5, 6, 7	Laboratory work.
Didactic unit: Transistors				
2. Amplifier (BT and PT).	2	6	1, 2, 3, 4, 5, 6, 7	Laboratory work.

Didactic unit: Operating amplifiers (OU)				
3. Research the characteristics of the OU.		6	1, 2, 3, 4, 5, 6, 7	Laboratory work.
4. Investigation of the characteristics of the amplifier on the OU.	2	6	1, 2, 3, 4, 5, 6, 7	Laboratory work.
6. Study of current sources on bipolar transistors		6	1, 2, 3, 4, 5, 6, 7	Laboratory work.
Didactic unit: Integrated logical elements				
5. Study of the characteristics of TTL and KMDP logic schemes		6	1, 2, 3, 4, 5, 6, 7	Laboratory work.

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Methodical support and software

Methodological support

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Specialized software

1 Calculator of the cost and timing of the project and its stages according to the COCOMO COCOMO® II.2000.4 methodology

2 Microsoft Office Application Pack

ANNOTATION OF THE PROGRAM

Schemery

Course: 3, semester : 5

		Semester
№	**Kind of activity**	**5**
1	Total credits	4
2	Total hours	144
3	Total classes in the contact form, hours	63
4	Lectures, hours	36
5	Practical lessons, hours	0
6	Laboratory studies, hours	18
7	of them in an active and interactive form, hours	8
8	Consultations, hours	7
9	Independent work, hours	81

External requirements

The ability to conduct research at all stages of the software product life cycle; *regarding the following learning results*:
have the completion skills in accordance with the task received
is able to search, critical analysis and synthesis of information, apply a systematic approach to solving the set Tasks; *regarding the following learning results*:
To be able to: apply search, collection and information processing techniques; Creit analysis and synthesis of information obtained from different sources; Apply the system approach to solve the tasks set.

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes
have the completion skills in accordance with the task received	
1. to be able to analyze the noise immunity of the schemes and analyze the effect of destabilizing factors, such as temperature and pulsation of food to the accuracy of the schemes.	Lections; Laboratory works; Independent work
2. Have experience of calculating, assembling and adjusting the scheme on operating amplifiers: large-scale amplifiers, differential amplifiers; Repeators, current sources, generators of harmonic and rectangular signals.	Lections; Laboratory works; Independent work
3. Be able to independently design electronic measuring devices, conduct experimental studies, configure electronic equipment.	Lections; Laboratory works; Independent work
4. To be able to analyze the error of the final version of the schemes.	Lections; Laboratory works; Independent work

To be able to: apply search, collection and information processing techniques; Creit analysis and synthesis of information obtained from different sources; Apply the system approach to solve the tasks set.	
5. to know the schemes of matching, gain and transform the measured signals.	Lections; Independent work
6. Know the basic methods of data processing using modern software and mathematical support in solving research tasks	Lections; Independent work
7. to have an idea of ??the nomenclature of the electronic components manufactured by industry.	Lections; Laboratory works; Independent work
8. Know the device and operation of diodes, transistors, operating amplifiers, basic elements of KMDP and TTL schemes.	Lections; Laboratory works; Independent work
9. Be able to search for the necessary information, it is critical to analyze it and summarize the results of the analysis to solve the task	Lections; Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 5				
Didactic unit: Schemery.				
1. circuitry. Application area. Analog and digital circuit engineering. Schematic diagram, circuit pattern. PCBs		4	1, 2, 3, 4, 5, 6, 7, 8, 9	Lecture.
Didactic unit: Power supplies.				
2. Radiation sources and photodetectors for FPI		2	1, 2, 3, 4, 5, 6, 8, 9	Lecture.
Didactic unit: Structural schemes SAU				
8. Comparative devices (comparators). Application. Specifications. Gating comparators. Circuit design.	2	4	1, 2, 3, 4, 5, 6, 8, 9	Lecture.
Didactic unit: Measuring detectors.				
9. Measuring detectors. Rectifiers of amplitude and medium stress values. Phase sensitive rectifier. Specifications. Circuit design.	2	4	1, 2, 3, 4, 5, 6, 8, 9	Lecture.
Didactic unit: F Iloofy global problems of humanity				
11. Filters. Passive and active filters. Varieties of filters. Batterworth and Chebyshev filters. The structure of salted and kay, the structure of Raug. Specifications. Circuit design.	2	4	1, 2, 3, 4, 5, 6, 7, 8, 9	Lecture.
Didactic unit: Devices of sampling and storage of the signal.				
12. Sample and signal storage devices. Circuit design. Specifications. Application.	2	4	1, 2, 3, 4, 5, 6, 8, 9	Lecture.
Didactic unit: Measuring transducers of electrical values ??and temporary Signal parameters in constant voltage.				

13. Measuring transducers of electrical values ??and time parameters of signals in constant voltage. Varieties, circuitry, errors.		4	1, 2, 3, 4, 5, 6, 8, 9	Lecture.
Didactic unit: Generators.				
16. Generators of harmonic signals. Varieties. Circuit design. Stability of frequency and amplitude. Pulse generators. Varieties. Circuit design. Stabilization of frequency and amplitude. Waiting mode. Waiting generators. The stability of the duration of the output pulses.		4	1, 2, 3, 4, 5, 6, 8, 9	Lecture.
Didactic unit: Digital circuitry.				
18. Digital circuit engineering. Integral logical elements. Varieties. Basic elements on KMDP (MOS) transistors. Characteristics and parameters. Logic elements with three states at the output. Measuring keys. Switches current and voltage. Static and dynamic characteristics. Areas of use. Trigger devices. Asynchronous and synchronous (tactable) triggers. R-S, J-K and D-triggers. Circuitry triggers. Pulse counters. Sequential meter scheme. Speed. Frequency dividers. Parallel action counters. Speed. Reversible counters. Ring. Registers with parallel and consistent code record. Circuitry, work, properties. Digital comparison devices. Logical element "or exclusively". Schemery of the Code Comparison Device. Multiplexers, demultiplexers, decoders. Application. Specifications. Digital and analog-digital converters (ADC and DAC). The process of the AC transformation. Discretization of time, quantization and encoding.		6	1, 2, 3, 4, 5, 6, 8, 9	Lecture.

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 5				
Didactic unit: Operating amplifiers (OU)				
3. Research of the algorithms of automated optimization of control systems		2	2, 3, 4, 7, 9	Laboratory work.
Didactic unit: Power supplies.				

4. Study of current sources on bipolar transistors		2	3, 4, 8, 9	Laboratory work.
6. Research of pulsed power supplies		2	1, 3, 4, 9	Laboratory work.
7. Research sources of reference voltage (ion)		5	1, 3, 4, 9	Laboratory work.
Didactic unit: Measuring detectors.				
10. Research of amplitude detectors and averages		2	3, 4, 9	Lecture.
Didactic unit: Measuring transducers of electrical values ??and temporary Signal parameters in constant voltage.				
14. Study of schemes with pulse modulation (PWM)		2	3, 4, 9	Laboratory work.
Didactic unit: Generators.				
17. Study of voltage generators in auto-oscillatory and waiting modes of operation		3	3, 4, 7, 9	Laboratory work.

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Methodical support and software

Methodological support

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Specialized software

1 Calculator of the cost and timing of the project and its stages according to the COCOMO COCOMO® II.2000.4 methodology

2 Microsoft Office Application Pack

ANNOTATION OF THE PROGRAM
Mobile applications

Course: 3, semester : 5

		Semester
№	**Kind of activity**	**5**
1	Total credits	4
2	Total hours	144
3	Total classes in the contact form, hours	43
4	Lectures, hours	18
5	Practical lessons, hours	0
6	Laboratory studies, hours	18
7	of them in an active and interactive form, hours	18
8	Consultations, hours	5
9	Independent work, hours	101

External requirements

The ability to conduct research at all stages of the software product life cycle; ***regarding the following learning results*****:**
to know about the features of the project planning in accordance with the task received
is able to carry out social interaction and implement its role in the command; ***regarding the following learning results*****:**

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes
to know about the features of the project planning in accordance with the task received	
1. Know the tools for programming and the basics of design of mobile applications	Lections; Laboratory works; Independent work
2. To be able to design information networks and implement administration	Lections; Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities

Semester: 5				
Didactic unit: Introduction to the development of Android applications				
1. A brief history of Android OS. Intel for Android: developer partnership and toolkit. Application architecture for Android. Application resources. User interface. Application Development Toolkit for Android.		2	1	Lecture.
2. Overview of the development steps of a typical Android application. Development features using an emulator. Debugging code in the emulator and on real applications.	1	2	1	Lecture.
Didactic unit: Creating user interfaces and the use of controls in Android applications »				
3. Text controls, buttons, lists, tables, date control and dates time, MapView, Gallery, Counter, Template Manager, Adapters, Menu Creating, Advanced menus, downloading the menu using XML files, creating dialog boxes, dialog boxes with prompts and warnings.	1	4	1, 2	Lecture.
Didactic unit: 2D animation, creating and use of services in applications under "Android"				
4. Planning frame animation, animation, animation of templates, species, use of Camera class.	1	3	1, 2	Lecture.
5. Security check, work with location-based services, Using HTTP services, AIDL services	1	2	2	Lecture.
Didactic unit: Working with Android Market				
6. Preparation of AndroidManifest.xml for download, application localization, application shortcut preparation, preparation APK file for download, user work with Android Market.	1	2	1	Lecture.
7. Intel tools for optimizing and debugging Android applications Intel Power Monitoring Tool. Intel Graphics Performance Analyzer. Intel Energy Checker SDK. Intel Hardware Accelerated Execution Manager.	1	3	1, 2	Lecture.

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities

Semester: 5				
Didactic unit: Creating user interfaces and the use of controls in Android applications »				
1. Meeting with the concept of interfaces. Getting practical skills in programming in Java.	4	5	1, 2	Laboratory work.
Didactic unit: 2D animation, creating and use of services in applications under "Android"				
2. Learning the basis of work in Intel XDK. Study of the portable application and recycling interface. Transferring interface to Intel XDK Wednesday, taking into account the features of mobile applications.	4	5	1, 2	Laboratory work.
Didactic unit: Working with Android Market				
3. Write in Java to the Android operating system Calculator, in which for integers, to provide the addition buttons, subtraction, multiplication, integer division, finding the remainder of the division, the amounts of the module two, converts to the binary code.	4	8	1, 2	Laboratory work.

Table 3.3

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 5				
Didactic unit: Introduction to the development of Android applications				
1. Planning frame animation, animation.		10	1	Independent work
Didactic unit: Working with Android Market				
2. Intel for Android: partnership and developer toolkit. Application architecture for Android. Application Development Toolkit for Android.		10	1	Independent work.

Literary sources

Main literature

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Specialized software

1 Mysql Mysql database management system

2 Opportification system of PostgreSQL POSTGRESQL database management system, PostgreSQL-8.4.1-1-Windows

ANNOTATION OF THE PROGRAM

Operating systems

Course: 2, semester : 4

		Semester
№	**Kind of activity**	**4**
1	Total credits	4
2	Total hours	144
3	Total classes in the contact form, hours	84
4	Lectures, hours	36
5	Practical lessons, hours	0
6	Laboratory studies, hours	36
7	of them in an active and interactive form, hours	16
8	Consultations, hours	10
9	Independent work, hours	60

External requirements

is able to search, critical analysis and synthesis of information, apply a systematic approach to solving the set Tasks; *regarding the following learning results*:
own: search methods, collection and processing, critical analysis and information synthesis; method of a systematic approach to solving the tasks.
To be able to: apply search, collection and information processing techniques; Creit analysis and synthesis of information obtained from different sources; Apply the system approach to solve the tasks set.
The ability to carry out project activities at all stages of the project's life cycle; *regarding the following learning results*:
to be able to determine the problem and how to solve it in the project

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes
To be able to: apply search, collection and information processing techniques; Creit analysis and synthesis of information obtained from different sources; Apply the system approach to solve the tasks set.	
1. to be able to extract and analyze information from various sources, including in the field of operating systems	Lections; Laboratory works; Independent work
own: search methods, collection and processing, critical analysis and information synthesis; method of a systematic approach to solving the tasks.	
2. Know the basic principles of converting various types of energy, the impact of these transformations to the environment	Lections; Laboratory works; Independent work

to be able to determine the problem and how to solve it in the project	
3. To be able to configure specific operating system configurations	Lections; Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 4				
Didactic unit: Architecture of operating systems				
1. The content of discipline. Main section courses. Literature. History of computing equipment and development of operating systems (OS).		1	1, 2	Lecture.
2. Appointment and main functions of OS.- Modated and multitasking OS. The main features of Windows. The principle of displacing multitasking.		1	1, 2	Lecture.
3. Windows XP architecture. Structure and components OS. The kernel of the OS and its objects. Multilayer structure of the OS kernel. Machine-dependent components of the OS.		2	1, 2	Lecture.
4. Windows API application programming interface. The overall characteristics of the API functions and the principles of their use.		2	1, 2	Lecture.
Didactic unit: Processes and streams				
5. The concepts of the process and flow. Creating and completing processes. WinExec () functions, SHELLEXECUTE (), CreateProcess (). Features of their use.		2	1, 2, 3	Lecture.
6. Creating a stream. The CreateThread () function and the input function of the stream. Completion of flow. Context structure. Descriptors of processes and streams.		2	1, 2, 3	Lecture.
7. Flow planning. Priority classes of processes and flows. Programming priorities. Dynamic change in streaming priority system. Sustainment and resumption of flows.		2	1, 2, 3	Lecture.

8. Principles of data exchange between flows of one process and several processes. Synchronization of processes and streams in user mode. Interlocked functions and critical sections.		2	1, 2	Lecture.
9. Core objects for synchronization of processes: Mutexes, events. Recommendations for their application, examples		2	1, 2, 3	Lecture.
10. Core objects for synchronization of processes: semaphores, wait timers. Recommendations for their application, examples.		2	1, 2, 3	Lecture.
Didactic unit: PC memory architecture				
11. Windows memory architecture. Virtual memory. Page and segment organization of memory. PageTags. Rapid address conversion buffers. Windows API functions to manage virtual memory.		2	1, 2, 3	Lecture.
12. Using virtual memory in applications . Projected to memory files. Exchange information between applications through the map of the displayed memory.		2	1, 2, 3	Lecture.
13. Passage of messages in the system. Okonny messages. Creating and processing your own posts.		2	1, 2, 3	Lecture.
Didactic unit: File systems				
14. file system and its structure. Varieties of file systems. Fat32 and NTFS file systems. I / O devices (V / B). The structure of the I / O system. Device drivers. Interrupts. Address spaces for devices in / c. Buffering operations in / c. Direct memory access (DMA).		6	1, 2, 3	Lecture.
Didactic unit: Security in OS				
15. Security in operating systems on the example of Windows XP. MS-DOS operating system. System properties and characteristics of UNIX OS.		6	1, 2, 3	Lecture.

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities

Semester: 4				
Didactic unit: Didactic unit: Processes and streams				
1. Creating subsidiaries in Windows. Creating secondary streams in the process. Stream synchronization using kernel objects.	3	7	1, 2, 3	Laboratory work.
2. Acquisition of practical skills of using Windows API to create processes and streams.	3	7	1, 2, 3	Laboratory work.
3. Studying the organization of multiprogramming in Windows, the purchase of practical skills to use the Windows API tools to create multi-threaded [applications.	3	7	1, 2, 3	Laboratory work.
4. Studying the principles for using the synchronization objects of the kernel mode to ensure monopolous access to shared resources, the acquisition of practical skills of using API funds Windows to create multi-threaded [applications.	3	7	1, 2, 3	Laboratory work.
Didactic unit: ECM memory architecture				
5. The exchange of information between processes through the region of the displayed memory.	4	8	1, 2, 3	Laboratory work.

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Main literature

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Methodical support and software

Methodological support

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Specialized software

1 Creating reports for laboratory work. Microsoft Microsoft Office

2 Integrated development environment Microsoft Visual Studio

ANNOTATION OF THE PROGRAM

Theory of information processes and systems

Course: 3, semester : 6

		Semester
№	**Kind of activity**	**6**
1	Total credits	3
2	Total hours	108
3	Total classes in the contact form, hours	63
4	Lectures, hours	18
5	Practical lessons, hours	0
6	Laboratory studies, hours	36
7	of them in an active and interactive form, hours	12
8	Consultations, hours	7
9	Independent work, hours	45

External requirements

The ability to conduct research at all stages of the software product life cycle; ***regarding the following learning results*****:**
to know about the features of the project planning in accordance with the task received
is able to determine the range of tasks in the framework of the target and choose the best ways to solve them, based on existing legal norms, resources available and restrictions; ***regarding the following learning results*****:**
to be able to: conduct an analysis of the goal and formulate the tasks that need to be solved to achieve it; analyze alternative options to achieve the outlined results; Use regulatory documentation in the field of professional activity.

Requirements for the results of mastering the discipline

The results of the study of the discipline	**Forms of organizing classes**
to know about the features of the project planning in accordance with the task received	
1. On the methods of identification of the substance	Lections; Laboratory works; Independent work
to be able to: conduct an analysis of the goal and formulate the tasks that need to be solved to achieve it; analyze alternative options to achieve the outlined results; Use regulatory documentation in the field of professional activity.	
2. on the design of electrical apparatus in accordance with the technical specifications and regulatory and technical documentation, taking into account the requirements of the requirements	Lections; Laboratory works; Independent work
to know about the features of the project planning in accordance with the task received	

3. On the modern scientific picture of the world in the mode of dialogue with other spheres of cultural philosophy, religion, ethics	Lections; Laboratory works; Independent work
4. Definitions of a complex system, signal, information processes and systems	Lections; Laboratory works; Independent work
5. Quantitative assessments of information and information processes	Lections; Laboratory works; Independent work
6. Methods of encoding images	Lections; Laboratory works; Independent work
to be able to: conduct an analysis of the goal and formulate the tasks that need to be solved to achieve it; analyze alternative options to achieve the outlined results; Use regulatory documentation in the field of professional activity.	
7. to use special documentation and literature in the area studied	Lections; Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 6				
Didactic unit: Introduction to the theory of information processes and systems				
1. The main definitions and characteristics of the systems	1	1	1, 3, 7	Lecture is carried out in the form of an extended discussion
Didactic unit: Instrumental methods and energy efficiency controls				
1. Information networks as open information systems. Multi-level approach. Theoretical foundations of information networks. Basic reference model of the International Standards Organization (OSI model). Modularity and standardization. Network services.	1	1	1, 2, 5, 7	Lecture is carried out in the form of an extended discussion
2. signals in systems	1	1	1, 3, 4	Lecture is carried out in the form of an extended discussion
2. Quantitative estimate of information	1	1	1, 2, 5	Lecture is carried out in the form of an extended discussion
Didactic unit: Models of information systems				
3. Models of the composition and structure of the system	1	1	6	Lecture is carried out in the form of an extended discussion
3. Model "Black box"	1	1	6	Lecture is carried out in the form of an extended discussion
4. Dynamic models of systems	1	1	6	Lecture is carried out in the form of an extended discussion
Didactic unit: Artificial and natural systems				
4. Structure of natural objects	1	1	1, 3, 4	Lecture is carried out in the form of an extended discussion
Didactic unit: Synchronous Machines.				
5. The patterns of systems	1	1	1, 3, 4, 6	Lecture is carried out in the form of an extended discussion
Didactic unit: Methods of describing systems				
5. Qualitative and quantitative methods for describing systems	1	1	3, 4, 6	Lecture is carried out in the form of an extended discussion

6. Mapping the flow of consumer value.	1	1	3, 4, 6	Lecture is carried out in the form of an extended discussion
6. Dynamic description of information systems	1	1	3, 4, 6	Lecture is carried out in the form of an extended discussion
Didactic unit: Synthesis and decomposition of information systems				
7. Combination of analysis and synthesis in a systematic study		1	3, 4, 6	
Didactic unit: Informational decision-making models				
7. Choosing as a purpose		1	2, 3, 4, 5	
Didactic unit: Basics of Development of Multi-Conceptual Applications				
8. Dynamic approach		1	1, 3, 4, 6, 7	
8. self-organization and chaotization		1	1, 3, 4, 6, 7	
9. Dynamic chaos		1	1, 3, 4, 6, 7	
9. Dissipative systems		1	1, 3, 4, 6, 7	

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 6				
Didactic unit: Instrumental methods and energy efficiency controls				
1. Building three-dimensional graphs. Programming in Matlab.		4	4, 5	acquisition of practical skills to work with application programs. Development of the ability to use scientific and technical literature in the form of textbooks, teaching aids, electronic materials. Acquisition of practical skills of competent registration of reporting documentation.
2. Work in the command window of the MATLAB system		4	4, 5	acquisition of practical skills to work with application programs. Development of the ability to use scientific and technical literature in the form of textbooks, teaching aids, electronic materials. Acquisition of practical skills of competent registration of reporting documentation.

3. Calculating certain integrals in Matlab environment		4	4, 5	acquisition of practical skills to work with application programs. Development of the ability to use scientific and technical literature in the form of textbooks, teaching aids, electronic materials. Acquisition of practical skills of competent registration of reporting documentation.
Didactic unit: Basics of Development of Multi-Conceptual Applications				
4. Chaotic properties of nonlinear systems		6	1, 3, 4, 6, 7	acquisition of practical skills to work with application programs. Development of the ability to use scientific and technical literature in the form of textbooks, teaching aids, electronic materials. Acquisition of practical skills of competent registration of reporting documentation.
5. Discrete mappings and bifurcation diagrams		6	1, 3, 4, 6, 7	acquisition of practical skills to work with application programs. Development of the ability to use scientific and technical literature in the form of textbooks, teaching aids, electronic materials. Acquisition of practical skills of competent registration of reporting documentation.
6. Maps of dynamic modes and lattices related maps		6	1, 2, 4, 6, 7	acquisition of practical skills to work with application programs. Development of the ability to use scientific and technical literature in the form of textbooks, teaching aids, electronic materials. Acquisition of practical skills of competent registration of reporting documentation.
7. Phase portraits of dynamic systems		6	1, 3, 4, 6, 7	acquisition of practical skills to work with application programs. Development of the ability to use scientific and technical literature in the form of textbooks, teaching aids, electronic materials. Acquisition of practical skills of competent registration of reporting documentation.

Literary sources

Main literature

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2. Рабинович Е. В. Методы и средства обработки сигналов [Электронный ресурс] : учебно-методический комплекс / Е. В. Рабинович ; Новосиб. гос. техн. ун-т. - Новосибирск, [2012]. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000164476. - Загл. с экрана.

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2. Сарычева О. М. Теория систем и системный анализ : конспект лекций / О. М. Сарычева ; Новосиб. гос. техн. ун-т. - Новосибирск, 2008. - 114, [1] с. : ил.. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000077913

Internet resources

1. Современные проблемы науки и образования [Электронный ресурс] : электрон. науч. журн. – Режим доступа: http://elibrary.ru/title_about.asp?id=11941. – Загл. с экрана

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Methodical support and software

Methodological support

1. Рабинович Е. В. Теория информационных процессов и систем [Электронный ресурс] : учебно-методический комплекс / Е. В. Рабинович ; Новосиб. гос. техн. ун-т. - Новосибирск, [2012]. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000164478. - Загл. с экрана.

Specialized software

1 Scientific and Technical Computing Program Mathworks Matlab

ANNOTATION OF THE PROGRAM
Intelligent information systems and technologies

Course: 4, semester : 7

		Semester
№	**Kind of activity**	**7**
1	Total credits	4
2	Total hours	144
3	Total classes in the contact form, hours	64
4	Lectures, hours	36
5	Practical lessons, hours	0
6	Laboratory studies, hours	18
7	of them in an active and interactive form, hours	18
8	Consultations, hours	8
9	Independent work, hours	80

External requirements

is able to search, critical analysis and synthesis of information, apply a systematic approach to solving the set Tasks; *regarding the following learning results*:
own: search methods, collection and processing, critical analysis and information synthesis; method of a systematic approach to solving the tasks.
The ability to carry out project activities at all stages of the project's life cycle; *regarding the following learning results*:
to be able to determine the problem and how to solve it in the project

Requirements for the results of mastering the discipline

The results of the study of the discipline	**Forms of organizing classes**
own: search methods, collection and processing, critical analysis and information synthesis; method of a systematic approach to solving the tasks.	
1. UK-1. 3 3. Own: search methods, collection and processing, critical analysis and information synthesis; A method of a systematic approach to solving the tasks.	Lections; Laboratory works; Independent work
to be able to determine the problem and how to solve it in the project	
2. PK-17.V / on. 1 1. To be able to determine the problem and ways to solve it in the project	Lections; Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 7				
Didactic unit: Basics of artificial intelligence and intelligent systems				
1. History and main directions of AI		2	1	Lecture
2. Presentation and solution of tasks in AI		2	1	Lecture
Didactic unit: Intellectual systems based on knowledge				
3. Methods of presenting knowledge and logical conclusion	4	6	1, 2	Lectures
4. Expert systems		2	1	Lecture
5. Fuzzy output in control systems	2	2	1, 2	Lecture
Didactic unit: Connectionist approach in intellectual systems				
6. Types of neural networks and methods of their training	4	8	1, 2	Lectures
7. Application of neural networks in control systems	2	2	1, 2	Lecture
8. Probabilistic Training Methods		2	1	Lecture
Didactic unit: Communication in natural language				
9. Difficulties of simulation understanding of a natural language	2	2	1	Lecture
10. Methods for modeling a natural language understanding	4	4	1, 2	Lectures
11. Speech communication with intellectual systems		2	1	Lecture
12. Trends in the development of AI		2	1	Lecture

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 7				
Didactic unit: Intellectual systems based on knowledge				
1. Basics of programming on prologue		4	1, 2	Laboratory work
2. Building a knowledge base for an expert system		4	1, 2	Laboratory work
Didactic unit: Connectionist approach in intellectual systems				
3. Multilayer Persheppon and Hopfield Model		4	1, 2	Laboratory work
Didactic unit: Communication in natural language				
4. Programming a dialogue on the AIML language		6	1, 2	Laboratory work

Literary sources

Main literature

1. Авдеенко Т. В. Введение в искусственный интеллект и логическое программирование. Программирование в среде Visual Prolog : [учебное пособие] / Т. В. Авдеенко, М. Ю. Целебровская ; Новосиб. гос. техн. ун-т. - Новосибирск, 2020. - 60, [3] с. : ил.. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000242604

Additional literature

1. Гаврилов А. В. Гибридные интеллектуальные системы / А. В. Гаврилов ; Новосиб. гос. техн. ун-т. - Новосибирск, 2003. - 163 с. : ил.. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000020518

Internet resources

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2. http://elibrary.nstu.ru/

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Methodological support

1. Интеллектуальные системы и основы теории интеллектуального управления : методические указания к лабораторным работам для МТФ по направлению подготовки "Автоматизация технологических процессов и производств" / Новосиб. гос. техн. ун-т ; [сост. А. В. Гаврилов]. - Новосибирск, 2012. - 29, [1] с. : ил., табл.. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000176779

2. Ганелина Н. Д. Интеллектуальные системы и технологии [Электронный ресурс] : электронный учебно-методический комплекс / Н. Д. Ганелина, М. Г. Гриф ; Новосиб. гос. техн. ун-т. - Новосибирск, [2020]. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000242694. - Загл. с экрана.

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Specialized software

Использование специализированного программного обеспечения для изучения дисциплины не требуется

ANNOTATION OF THE PROGRAM
Computer technologies for analyzing and processing data

Course: 3, semester : 6

		Semester
№	**Kind of activity**	**6**
1	Total credits	4
2	Total hours	144
3	Total classes in the contact form, hours	43
4	Lectures, hours	18
5	Practical lessons, hours	0
6	Laboratory studies, hours	18
7	of them in an active and interactive form, hours	16
8	Consultations, hours	5
9	Independent work, hours	101

External requirements

is able to carry out professional activities, taking into account the regional features and needs of employers; ***regarding the following learning results*:**
is able to analyze the activities of enterprises and organizations of their profile industry.
The ability to carry out project activities at all stages of the project's life cycle; ***regarding the following learning results*:**
to be able to determine the problem and how to solve it in the project
To be able to identify the necessary resources for the implementation of project tasks
to be able to organize and coordinate the work of the project participants

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes
is able to analyze the activities of enterprises and organizations of their profile industry.	
1.. Electric drives	Lections; Laboratory works; Independent work
to be able to determine the problem and how to solve it in the project	
2. to be able to determine the objectives, the subject area and the project structure	Lections; Laboratory works; Independent work
to be able to organize and coordinate the work of the project participants	
3. to be able to participate in the management of projects for creating information systems at the life cycle stages	Lections; Laboratory works; Independent work

To be able to identify the necessary resources for the implementation of project tasks	
4. To be able to use the main philosophical methods	Lections; Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 6				
Didactic unit: The simplest types of deformations.				
1. Project Life Cycle. Project management processes. Structural Decomposition of Project Works		2	2	Lecture.
Didactic unit: Project life cycle				
2. Project life cycles in IT. Preparation of the project of the project	1	3	2, 4	Lecture.
Didactic unit: Organizational structures in projects				
3. Project schedule. Temporary links.	2	2	3, 4	Lecture.
Didactic unit: Management of the main limitations of the project. Cost management Project.				
4. Project management by temporary parameters. The main components of the project plan. Development of a calendar plan. Project Budget.	1	3	4	Lecture.
Didactic unit: Project Communication Management				
5. Project Communication Management. Select project management system.		2	4	Lecture.
Didactic unit: Risk Management in the project				
6. Identification of risks. Conduct quality and quantitative Risk tests.		2	4	Lecture.
Didactic unit: CHP - as technological systems Centralized production of electrical, heat energy.				
7. Projects, project portfolios, programs. Design office. Functional, design and matrix organizational structures. Strong, weak and balanced matrix.		2	1	Lecture.
8. Project management features in various industries. Types of innovation. Innovation management.		2	1, 4	Lecture.

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 6				

Didactic unit: Organizational structures in projects				
1. Building an organizational project management structure.	3	5	1, 2, 3, 4	Laboratory work.
Didactic unit: Management of the main limitations of the project. Cost management Project.				
2. Resources. Check and adjustment of the project plan.	3	4	2, 3, 4	Laboratory work.
Didactic unit: Project Communication Management				
3. Report and analysis of the project.	3	5	2, 3, 4	Laboratory work.
Didactic unit: Risk Management in the project				
4. Project risks.	3	4	2, 3, 4	Laboratory work.

Table 3.3

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 6				
Didactic unit: The simplest types of deformations.				
1. Historical prerequisites for the development of modern production systems.		5	2	Independent work.
Didactic unit: Project Communication Management				
2. Project management information systems		5	3	Independent work.

Literary sources

Main literature

1. Иванилова, С. В. Управление инновационными проектами : учебное пособие для бакалавров / С. В. Иванилова. — Москва : Дашков и К, Ай Пи Эр Медиа, 2018. — 188 с. — ISBN 978-5-394-02895-3. — Текст : электронный // Электронно-библиотечная система IPR BOOKS : [сайт]. — URL: http://www.iprbookshop.ru/66843.html (дата обращения: 13.03.2021). — Режим доступа: для авторизир. пользователей

Additional literature

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Methodical support and software

Methodological support

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Specialized software

Использование специализированного программного обеспечения для изучения дисциплины не требуется

ANNOTATION OF THE PROGRAM

Application packages of programs for calculating emergency modes of power systems

Course: 4, semester : 7

		Semester
№	**Kind of activity**	**7**
1	Total credits	4
2	Total hours	144
3	Total classes in the contact form, hours	68
4	Lectures, hours	18
5	Practical lessons, hours	0
6	Laboratory studies, hours	36
7	of them in an active and interactive form, hours	18
8	Consultations, hours	12
9	Independent work, hours	76

External requirements

The ability to conduct research at all stages of the software product life cycle; ***regarding the following learning results*:**
have the completion skills in accordance with the task received
is able to determine the range of tasks in the framework of the target and choose the best ways to solve them, based on existing legal norms, resources available and restrictions; ***regarding the following learning results*:**
to be able to: conduct an analysis of the goal and formulate the tasks that need to be solved to achieve it; analyze alternative options to achieve the outlined results; Use regulatory documentation in the field of professional activity.

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes
have the completion skills in accordance with the task received	
1. To be able to solve non-standard scientific and practical tasks related to professional activities	Lections; Laboratory works; Independent work
to be able to: conduct an analysis of the goal and formulate the tasks that need to be solved to achieve it; analyze alternative options to achieve the outlined results; Use regulatory documentation in the field of professional activity.	
2. Know the specifics of moral, moral and spiritual levels of human existence	Lections; Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 7				
Didactic unit: Large data. Basics of large data systems.				
1. The concept of "big data". The characteristics of large data. Principles of work with big data. Big data in scientific research. Ecosystem of large data.		2	1, 2	Lecture.
2. Distributed File Systems. Distributed frameworks. Benchmarking. Server programming. Planning. Deployment systems.		2	1, 2	Lecture.
3. Integration of data. Machine training. NOSQL databases and new SQL databases.		2	1, 2	Lecture.
Didactic unit: Computing networks				
4. Levels in large data processing systems. Data receiving (Data Ingestion). Data collection (Data Staging). Data Analysis (Analysis Layer). Representation of the results (Consumption Layer).		3	1, 2	Lecture.
Didactic unit: Parallel algorithms for working with data.				
5. Map and Reduce operators. MAP operator (pre-processing). Operator reduce (convolution). Lambda architecture. Kappa architecture.		3	1, 2	Lecture.
Didactic unit: Software Platforms and Systems for Large Data .				
6. Data flow control systems. Large data storage systems. Platform Large data. Treatment of data in real time		2	1, 2	Lecture.
7. Large data management systems. Analytical platforms. Composition and capabilities of the Apache Hadoop software package.	1	2	1, 2	Lecture.
8. Search queries for Hadoop. Principles of work Apache Spark. Other components of the Hadoop ecosystem.	1	2	1, 2	Lecture.

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities

Semester: 7				
Didactic unit: Large data. Basics of large data systems.				
1. Search and definition BIG DATA.	2	4	1	Laboratory work.
Didactic unit: Computing networks				
2. Storage of large data.	2	4	1	Laboratory work.
Didactic unit: Parallel algorithms for working with data.				
3. Analytical Platforms: Classification and Application Features	2	4	1, 2	Laboratory work.
4. Forecasting using linear regression.	2	4	1, 2	Laboratory work.
5. Algorithm of large data clusterization.	2	5	1, 2	Laboratory work.
Didactic unit: Software Platforms and Systems for Large Data .				
6. Search for associative rules.	2	5	1, 2	Laboratory work.
7. Classification using a neural network.	2	5	1, 2	Laboratory work.
8. Classification using decisions trees.	2	5	1, 2	Laboratory work.

Table 3.3

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 7				
Didactic unit: Large data. Basics of large data systems.				
1. expiration through a centrifugal nozzle.		18	1, 2	Independent work.
Didactic unit: Parallel algorithms for working with data.				
2. Software in the field of large data. Languages ??of visual modeling.		18	1, 2	Independent work.

Literary sources

Main literature

1. Макшанов, А. В. Большие данные. Big Data : учебник для вузов / А. В. Макшанов, А. Е. Журавлев, Л. Н. Тындыкарь. — Санкт-Петербург : Лань, 2021. — 188 с. — ISBN 978-5-8114-6810-2. — Текст : электронный // Лань : электронно-библиотечная система. — URL: https://e.lanbook.com/book/165835 (дата обращения: 10.03.2021). — Режим доступа: для авториз. пользователей.

Additional literature

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Methodical support and software

Methodological support

1. Воронов, В. И. Data Mining - технологии обработки больших данных : учебное пособие / В. И. Воронов, Л. И. Воронова, В. А. Усачев. — Москва : Московский технический университет связи и информатики, 2018. — 47 c. — ISBN 2227-8397. — Текст : электронный // Электронно-библиотечная система IPR BOOKS : [сайт]. — URL: http://www.iprbookshop.ru/81324.html (дата обращения: 10.03.2021). — Режим доступа: для авторизир. пользователей

2. Чубукова, И. А. Data Mining : учебное пособие / И. А. Чубукова. — 3-е изд. — Москва, Саратов : Интернет-Университет Информационных Технологий (ИНТУИТ), Ай Пи Ар Медиа, 2020. — 469 c. — ISBN 978-5-4497-0289-0. — Текст : электронный // Электронно-библиотечная система IPR BOOKS : [сайт]. — URL: http://www.iprbookshop.ru/89404.html (дата обращения: 10.03.2021). — Режим доступа: для авторизир. пользователей

Specialized software

1 DBMS Microsoft Microsoft SQL Server

2 Creating reports for laboratory work. Microsoft Microsoft Office

ANNOTATION OF THE PROGRAM

History (History of Russia, Universal History)

Course: 4, semester : 7

		Semester
№	**Kind of activity**	**7**
1	Total credits	5
2	Total hours	180
3	Total classes in the contact form, hours	78
4	Lectures, hours	36
5	Practical lessons, hours	0
6	Laboratory studies, hours	36
7	of them in an active and interactive form, hours	0
8	Consultations, hours	4
9	Independent work, hours	102

External requirements

The ability to conduct research at all stages of the software product life cycle; ***regarding the following learning results*****:**
have the completion skills in accordance with the task received
to know about the features of the project planning in accordance with the task received
is able to search, critical analysis and synthesis of information, apply a systematic approach to solving the set Tasks; ***regarding the following learning results*****:**
To be able to: apply search, collection and information processing techniques; Creit analysis and synthesis of information obtained from different sources; Apply the system approach to solve the tasks set.

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes
1. Know the basic concepts, types of microcontroller architectures and microprocessors	Lections; Laboratory works; Independent work
to know about the features of the project planning in accordance with the task received	
2. Know the means of programming and debugging microcontrollers	Lections; Laboratory works; Independent work
have the completion skills in accordance with the task received	
3. own methods and means of debugging and testing microcontrollers and microprocessors	Lections; Laboratory works; Independent work

To be able to: apply search, collection and information processing techniques; Creit analysis and synthesis of information obtained from different sources; Apply the system approach to solve the tasks set.	
4. To be able to use methods and means of debugging and testing microcontrollers and microprocessor systems	Lections; Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 7				
Didactic unit: General overview and classification of microprocessor equipment				
1. The history of the development of microprocessor equipment and the classification of modern MP.		4	1	Lecture.
Didactic unit: Register architecture MP				
2. Custom registers of MP family x86. 2. System registers.		4	1, 2	Lecture
Didactic unit: Memory management system				
3. Linear and segmented memory models and structure of segment descriptors. Formation of the physical address in the real and protected mode of the MP.		4	1, 2	Lecture.
Didactic unit: cache memory and the principles of its organization.				
4. The basic principles laid down in the Cash memory, which determine its effectiveness. Principles of organizing cache memory with direct display. Fully associative cache memory. Multiple associative cache memory. The principle of the batch exchange mode of information with cache memory and flowchart of its functioning.		4	1, 2	Lecture.
Didactic unit: Comparing devices (comparators).				
5. Sources of interrupt requests. Organization of the interrupt system in real mode of MP. Organization of interruption systems in the protected mode of the MP.		3	1, 2	Lecture.
Didactic unit: Methods of protection in microprocessors of the X86 family.				
6. Basic protection. Protection on the privileges of segments. Protection on team privileges.		3	1, 2	Lecture.
Didactic unit: Microcontrollers				

7. various types of microcontrollers. Processor architecture. Types of memory microcontrollers. Features of the use of microcontrollers in information systems. Problems of selecting MK.		3	1, 2	Lecture.
Didactic unit: The features of the design of microcontroller devices				
8. the main provisions, the structure of the MK - management system, features of the development of hardware and application software MK-systems.		4	1	Lecture.
Didactic unit: MEGAAVR microcontrollers				
9. Architecture overview. Description of conclusions. Restarting the microcontroller. Interrupt handler. Timers and counters. Universal asynchronous transceiver. I / O ports. Set of commands.		4	1	Lecture.
Didactic unit: Data compression methods in video systems				
10. Overview of architecture. Description of conclusions. Restarting the microcontroller. Interrupt handler. Timers and counters. Universal asynchronous transceiver. I / O ports. Set of commands.		3	1, 2, 3, 4	Lecture.

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 7				
Didactic unit: General overview and classification of microprocessor equipment				
1. Acquaintance with software-available elements and microprocessor nodes of the X86 family, as well as the features of the TURBO DEBUGGER debugger and the acquisition of the skills of using them for debugging assembler programs.		6	1, 2, 3, 4	Laboratory work.
Didactic unit: Register architecture MP				
2. Acquaintance with the assembler command commands system and study of the Machine Machine Processor Formats of the X86 processor.		6	1, 2, 3, 4	Laboratory work.
Didactic unit: Memory management system				

3. Studying the skills of drawing up assembler programs of simple tasks, compile and obtain executable files, as well as debugging them using the TURBO DEBUGGER debugger.		4	1, 2, 3, 4	Laboratory work.
Didactic unit: assembler. Wednesday Programming and debugging AVR Studio.				
4. Acquaintance with the AVR-Studio design environment. AVR command system: arithmetic teams.		4	1, 2, 3, 4	Laboratory work.
5. Addressing modes. Shipping teams. Commands teams		4	1, 2, 3, 4	Laboratory work.
6. AVR command system: commands of manipulations with bits. Modular programming. Subrogram .		6	1, 2, 3, 4	Laboratory work.
7. Interrupts Softwarems		6	1, 2, 3, 4	Laboratory work.

Table 3.3

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 7				
Didactic unit: Microcontrollers				
1. Features of the use of microcontrollers in information systems. Problems of selecting MK.		5	1	Independent work.
3. Description of the assembler commands. Overview of the medium interface programming. Work in debug mode. Working with C compiler. Apply the ATMEL Software Framework Libraries and Drivers.		10	1, 2	Independent work.
Didactic unit: MEGAAVR microcontrollers				
2. Instructing in familiarization with the requirements of labor protection, safety, fire safety, internal labor regulations. Discussion with the head of the Practice Topics and Work Plan.		5	1	Independent work.

Literary sources

Main literature

1. Сонькин, М. А. Микропроцессорные системы. Средства разработки программного обеспечения для микроконтроллеров семейства AVR : учебное пособие / М. А. Сонькин, А. А. Шамин. — Томск : Томский политехнический университет, 2016. — 90 c. — ISBN 978-5-4387-0676-2. — Текст : электронный // Электронно-библиотечная система IPR BOOKS : [сайт]. — URL: http://www.iprbookshop.ru/83973.html (дата обращения: 23.03.2021). — Режим доступа: для авторизир. пользователей

Internet resources

1. http://elibrary.nstu.ru/

2. https://e.lanbook.com/

3. Мятеж, С. В. Электронные и микропроцессорные устройства : электронный учебно-методический комплекс / С. В. Мятеж. – Новосибирск, [2015]. – Текст : электронный // Электронно-библиотечная система НГТУ : [сайт]. – Новосибирск, 2011–   . – URL: https://elibrary.nstu.ru/source?id=46786 (дата обращения: 24.03.2021).

4. http://www.iprbookshop.ru/

5. http://znanium.com/

Methodical support and software

Methodological support

1. Матушкин Г. Г. Микропроцессоры и микроконтроллеры [Электронный ресурс] : учебно-методическое пособие / Г. Г. Матушкин ; Новосиб. гос. техн. ун-т. - Новосибирск, [2007]. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000166419. - Загл. с экрана.

Specialized software

1 Calculator of the cost and timing of the project and its stages according to the COCOMO COCOMO® II.2000.4 methodology

2 Microsoft Office Application Pack

ANNOTATION OF THE PROGRAM
Programming technologies

Course: 2, semester : 4

		Semester
№	**Kind of activity**	**4**
1	Total credits	4
2	Total hours	144
3	Total classes in the contact form, hours	64
4	Lectures, hours	36
5	Practical lessons, hours	0
6	Laboratory studies, hours	18
7	of them in an active and interactive form, hours	18
8	Consultations, hours	8
9	Independent work, hours	80

External requirements

The ability to conduct research at all stages of the software product life cycle; ***regarding the following learning results*****:**
to know about the features of the project planning in accordance with the task received
is able to search, critical analysis and synthesis of information, apply a systematic approach to solving the set Tasks; ***regarding the following learning results*****:**
To be able to: apply search, collection and information processing techniques; Creit analysis and synthesis of information obtained from different sources; Apply the system approach to solve the tasks set.
The ability to carry out project activities at all stages of the project's life cycle; ***regarding the following learning results*****:**
To be able to identify the necessary resources for the implementation of project tasks

Requirements for the results of mastering the discipline

The results of the study of the discipline	**Forms of organizing classes**
to know about the features of the project planning in accordance with the task received	
1. To be able to execute scientific and technical reports in accordance with the requirements of GOST	Laboratory works; Independent work
2. to know the principles of development of distributed information and computing systems	Lections; Laboratory works; Independent work
To be able to: apply search, collection and information processing techniques; Creit analysis and synthesis of information obtained from different sources; Apply the system approach to solve the tasks set.	

3. to know the basics of system programming	Lections; Laboratory works; Independent work
4. Know the tools and methods for verification of the program code structure	Lections; Laboratory works; Independent work
To be able to identify the necessary resources for the implementation of project tasks	
5. The effect of electrical energy efficiency of electrical energy consumers	Lections; Laboratory works; Independent work
6. to know the methods of adaptation of applications to various conditions	Lections; Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 4				
Didactic unit: Basic Java language elements				
1. Synchronous engine: Characteristics, ways to start.		4	3, 4, 5, 6	Lecture.
2. Classes. Modifiers of access to classes and classes members. Overload, redefinition and dimming methods. Class designers.		2	3, 4, 5, 6	Lecture.
3. Inheritance in Java. Abstract classes. Interfaces. Assigning interfaces. Inheritance interfaces. Implementation of polymorphism in Java.		2	2, 3, 4, 5, 6	Lecture.
4. Nested and internal classes.		2	2, 3, 4, 5, 6	Lecture.
5. Exceptional situations. Exception Handling. Exception classes		2	2, 3, 4, 5, 6	Lecture.
Didactic unit: Various types of energy storage devices (electrochemical)				
6. Libraries to develop graphic user interfaces in Java. AWT. GUI elements.		2	2, 3, 4, 5, 6	Lecture.
7. Swing. Model graphic elements. GUI controls. Containers. Modal and uniform windows. Layout managers. Menu.		2	2, 3, 4, 5, 6	Lecture.
Didactic unit: Event processing				
8. Event processing models. Event classes. Event Listening Interfaces. Use the delegation model of events. Classes - adapters. Anonymous internal classes.		2	2, 3, 4, 5, 6	Lecture.
Didactic unit: Multi-threaded programming				

9. Java stream model. Creating threads. Condition of streams. Priorities. Synchronization. Transfer information between threads. Flow groups. Thread-demons.		2	2, 3, 4, 5, 6	Lecture.
Didactic unit: Communication of the parameters characterizing the properties of electrical materials with the parameters of electricity, electrical and radio electronic equipment.				
10. Classes - Object and Class. Classes - shells of simple types. Collections in Java. Reflection.		2	2, 3, 4, 5, 6	Lecture.
11. Client-server applications. Transferring data on TCP and UDP protocols.		2	2, 3, 4, 5, 6	Lecture.
12. I / O organization. Flow classes. Serialization. Management of serialization.		2	2, 3, 4, 5, 6	Lecture.
13. JDBC. Work with data warehouses in Java.		2	2, 3, 4, 5, 6	Lecture.
Didactic unit: Java Internet technology.				
14. SERVELS. SERVLET LIFE CYCLE. Applying servlets in Web applications.		2	2, 3, 4, 5, 6	Lecture.
15. "Thin" clients. Technologies used to develop a client part of the Web application.		4	2, 3, 4, 5, 6	Lecture.
16. JSP technology. Elements of server pages. Apply JavaBeans to implement the application business logic.		2	2, 4, 5, 6	Lecture.

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 4				
Didactic unit: Programming technology on Java				
1. Basics of programming on Java. Processing events. Mechanism of delegation of events.	6	4	1, 2, 3, 4, 5, 6	Laboratory work.
2. Development of a graphical interface. Classes collection.	4	4	1, 2, 3, 4, 5, 6	Laboratory work.
3. Multi-threaded applications. I / O streams. Serialization of objects to the file.	4	4	1, 2, 3, 4, 5, 6	Laboratory work.
4. Network "client-server" applications.	4	6	1, 2, 3, 4, 5, 6	Laboratory work.

Literary sources

Internet resources

1. Новицкая, Ю. В. Web-программирование : электронный учебно-методический комплекс / Ю. В. Новицкая. – Новосибирск, [2015]. – Текст : электронный // Электронно-библиотечная система НГТУ : [сайт]. – Новосибирск, 2011– . – URL: https://elibrary.nstu.ru/source?id=45357 (дата обращения: 11.03.2021). – Режим доступа: для авторизир. пользователей.

2. http://elibrary.nstu.ru/

3. https://e.lanbook.com/

4. http://www.iprbookshop.ru/

5. http://znanium.com/

Methodical support and software

Methodological support

1. Васюткина, И. А. Технология разработки объектно-ориентированных программ на JAVA : учебно-методическое пособие / И. А. Васюткина. — Новосибирск : Новосибирский государственный технический университет, 2012. — 152 c. — ISBN 978-5-7782-1973-1. — Текст : электронный // Электронно-библиотечная система IPR BOOKS : [сайт]. — URL: http://www.iprbookshop.ru/45047.html (дата обращения: 10.03.2021). — Режим доступа: для авторизир. пользователей

Specialized software

1 Tools Web Development in Java Oracle Java Development Kit

2 Simulation of IP Life Cycle Speed ??Specifier Software Projects and Staruml Design

ANNOTATION OF THE PROGRAM

Basics Management Theory

Course: 3, semester : 5

		Semester
№	**Kind of activity**	**5**
1	Total credits	4
2	Total hours	144
3	Total classes in the contact form, hours	58
4	Lectures, hours	18
5	Practical lessons, hours	0
6	Laboratory studies, hours	36
7	of them in an active and interactive form, hours	0
8	Consultations, hours	2
9	Independent work, hours	86

External requirements

The ability to conduct research at all stages of the software product life cycle; ***regarding the following learning results*****:**
have the completion skills in accordance with the task received
is able to carry out social interaction and implement its role in the command; ***regarding the following learning results*****:**
own: the simplest methods and techniques of social interaction and work in the team.

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes
have the completion skills in accordance with the task received	
1. Algorithms and mechanical calculation schemes	Lections; Laboratory works; Independent work
own: the simplest methods and techniques of social interaction and work in the team.	
3.3. To own the simplest methods and techniques of social interaction and work in the team.	Lections; Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results

Semester: 5			
Didactic unit: Introduction			
1. Basic management principles, setting the management task.		1	3
2. Mathematical models of saau		1	3
Didactic unit: Dynamic characteristics			
3. Ordinary diph. equations		1	3
4. UF, IPH		1	3
5. Frequency characteristics		1	3
6. Transient characteristics, gearboxes	0	1	3
Didactic unit: Project management in the organization			
7. Basic stability condition		1	3
8. Sustainability criteria		2	3
Didactic unit: Process Analysis			
9. Indicators of the quality of the transition process		2	3
10. Static and Astatic Systems		1	3
Didactic unit: Terms of solvability of the synthesis problem			
11. Controlness, observability, stability of the inverse object		1	1
12. Resource restriction		1	1
Didactic unit: Synthesis			
13. Frequency method of synthesis		2	1
14. Modal synthesis method		1	1
15. Typical regulator method		1	1

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 5				
Didactic unit: Dynamic characteristics				
1. Dynamic characteristics of linear systems		4	3	
9. Transient characteristics, Pulse transitional functions		4		
Didactic unit: Project management in the organization				

2. Stability of linear systems		4	3	
8. Sustainability of the 3rd order system		4	3	
Didactic unit: Process Analysis				
3. Analysis of processes in linear systems		4	1	
7. Analysis of the processes in the 3rd order system		4	1	
Didactic unit: Synthesis				
4. Frequency method of synthesis		4		
5. Modal synthesis method		4		
6. PID controllers		4		

Literary sources

Main literature

1. Востриков А. С. Основы теории непрерывных и дискретных систем регулирования : учебное пособие / А. С. Востриков, Г. А. Французова, Е. Б. Гаврилов ; Новосиб. гос. техн. ун-т. - Новосибирск, 2008. - 476 с.. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000118432. - Инновационная образовательная программа НГТУ «Высокие технологии».

Internet resources

1. eLIBRARY.RU (Научная электронная библиотека РФФИ) [Электронный ресурс]. – [Россия], 1998. – Режим доступа: http://(www.elibrary.ru). – Загл. с экрана.

2. http://elibrary.nstu.ru/

3. https://e.lanbook.com/

4. http://www.iprbookshop.ru/

5. http://znanium.com/

Methodical support and software

Methodological support

1. Французова Г. А. Основы теории управления : учебно-методическое пособие / Г. А. Французова, Г. В. Саблина ; Новосиб. гос. техн. ун-т. - Новосибирск, 2016. - 60, [2] с. : ил., табл.. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000234009

Specialized software

1 Scientific and Technical Computing Program Mathworks Matlab

ANNOTATION OF THE PROGRAM
Computing Mathematics

Course: 2, semester : 3

		Semester
№	**Kind of activity**	**3**
1	Total credits	5
2	Total hours	180
3	Total classes in the contact form, hours	63
4	Lectures, hours	36
5	Practical lessons, hours	0
6	Laboratory studies, hours	18
7	of them in an active and interactive form, hours	18
8	Consultations, hours	7
9	Independent work, hours	117

External requirements

The ability to conduct research at all stages of the software product life cycle; ***regarding the following learning results*:**
have the completion skills in accordance with the task received
is able to search, critical analysis and synthesis of information, apply a systematic approach to solving the set Tasks; ***regarding the following learning results*:**
To be able to: apply search, collection and information processing techniques; Creit analysis and synthesis of information obtained from different sources; Apply the system approach to solve the tasks set.

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes
have the completion skills in accordance with the task received	
1. to know the basic positions of the fundamental sections of mathematics in the amount required for owning a mathematical apparatus for processing information and analysis of data in the field of professional activities	Lections; Laboratory works; Independent work
2. Know the versatility of mathematical methods in the knowledge of the surrounding world	Lections; Laboratory works; Independent work
To be able to: apply search, collection and information processing techniques; Creit analysis and synthesis of information obtained from different sources; Apply the system approach to solve the tasks set.	
3. To be able to use elements of mathematical logic to build judgments and their evidence	Lections; Laboratory works; Independent work

4. To be able to apply the main methods of the mathematical apparatus in mathematical models of objects and processes	Lections; Laboratory works; Independent work
5. To be able to conduct calculations for all the well-known methods	Lections; Laboratory works; Independent work
6. To be able to use modern methods of theoretical research in scientific activity	Lections; Laboratory works; Independent work
7. To be able to find a subject of philosophical analysis and build the logic of the philosophical approach in the study of the events of the surrounding world	Lections; Laboratory works; Independent work
8. Know Numerical Methods: Calculation Errors, Numerical Methods of Linear Algebra, Interpolating and Approximations of the Function, Numerical Solution of Nonlinear Equations	Lections; Laboratory works; Independent work
9. Know the algorithms of computing mathematics used to solve practical tasks	Lections; Laboratory works; Independent work
10. to know the possibilities of computing mathematics methods for approximate solutions of incorrect tasks	Lections; Laboratory works; Independent work
11. To be able to use existing application packages and, if necessary, develop a new software of the required algorithms	Lections; Laboratory works; Independent work
12. Develop the calculation algorithms in distributed systems	Lections; Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 3				
Didactic unit: Interpolating functions				
1. Interpolating functions. Lagrange, Newton, Stirling polynomials, Bessel. Residual member of the interpolation formula, its estimation. Practical use of interpolation formulas. Spline approximation. The largest uniform approximation is polynomial.		6	1, 11, 12, 8, 9	Lecture.
2. orthogonal and normalized systems of functions. Legendra polynomials, Chebyshev. Functions trigonometric, lager, Walsh. Generalized Fourier Rows. Residual member of Fourier series, its estimation. Practical use of Fourier series.		6	1, 10, 11, 12, 2, 9	Lecture.
3. The incorrectness of the problem of numerical differentiation, regularization. Use of interpolation polynomials to calculate derivatives.		2	1, 10, 11, 12, 2, 3, 8, 9	Lecture.
4. Quadrature formulas Newton-Kotes. Selection of integration step.		2	1, 10, 11, 12, 2, 4	Lecture.
Didactic unit: Solution of an algebraic equation				

5. Nonlinear equations. Branch of roots. Clarification of roots. Dichotomy, Newton Method, descent method. Iterative methods for solving systems of linear algebraic equations. Method of simple iterations, the method of Zeidel, the method of the formal descent.		3	1, 10, 12, 2, 5, 8, 9	Lecture.
6. Iterative methods for solving systems of linear algebraic equations. Method of simple iterations, the method of Zeidel, the method of the formal descent.		2	1, 10, 12, 2, 5, 6, 8, 9	Lecture.
7. solving systems of nonlinear algebraic equations. Newton Method, the method of the Great Desk. Practical recommendations for the use of methods for solving algebraic equations and systems.		2	10, 12, 2, 5, 6, 8, 9	Lecture.
8. Methods of runge-ttta.		3	1, 10, 12, 2, 5, 6, 7, 8, 9	Lecture.
9. Adams methods. Explicit and implicit methods. Adams Methods with a forecast and correction of solutions. Performance of solving differential equations. Choosing a step decision. Practical recommendations for the use of methods for solving differential equations.		3	10, 12, 2, 4, 8, 9	Lecture.
Didactic unit: Methods of one-dimensional optimization				
10. Basic concepts and definitions. Setting the optimization problem. Methods of one-dimensional optimization. General search, division in half, "Golden" section.		3	10, 11, 12, 4, 9	Lecture.
11. Methods of multidimensional optimization. The coordinate descent, the method of the formal descent, the Nelder Mid method. Practical recommendations on the use of optimization methods.		4	10, 11, 12, 8, 9	Lecture.

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 3				
Didactic unit: Interpolating functions				

1. Lagrange polynomials, Newton. Evaluation of interpolating accuracy. The effect of the type of the interpolated function, the number and location of the nodes on the error.	4	4	10, 11, 12, 2, 4, 6, 7, 8, 9	Laboratory work. Give recommendations for the use of various interpolation polynomials
2. Quality of linear SAU in installed and transitional modes	4	4	10, 11, 2, 5, 7, 8, 9	Laboratory work. Enough the essence of numerical integration by Newton's quadrature formulas
Didactic unit: Solution of an algebraic equation				
3. The method of descending the solution of the nonlinear equation. Effect of the form of roots on the accuracy of the solution. Study of the influence of corrective parameters of the algorithm for errors	5	4	1, 10, 11, 2, 4, 6, 7, 8, 9	Laboratory work. Solve the algebraic equation of the third order by Newton method.
4. methods of Zeidel, pre-larger descent. Studies of the influence of the initial conditions on the number of iterations. Comparative characteristics of methods.		4	1, 10, 11, 3, 5, 7, 8, 9	Laboratory work. Create conditions for convergence and stop of the iterative methods of Zeidel and the Great descent.
Didactic unit: Methods of one-dimensional optimization				
5. Methods of coordinate descent, Nededer Mid. Comparative characteristics.	5	2	10, 11, 2, 7, 8, 9	Laboratory work. Enough the choice of corrective parameters of the Nededer Mid method in order to reduce the number of iterations.

Literary sources

Main literature

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Specialized software

1 Calculator of the cost and timing of the project and its stages according to the COCOMO COCOMO® II.2000.4 methodology

2 Microsoft Office Application Pack

ANNOTATION OF THE PROGRAM
Testing information systems

Course: 4, semester : 8

		Semester
№	**Kind of activity**	**8**
1	Total credits	4
2	Total hours	144
3	Total classes in the contact form, hours	42
4	Lectures, hours	4
5	Practical lessons, hours	0
6	Laboratory studies, hours	22
7	of them in an active and interactive form, hours	10
8	Consultations, hours	14
9	Independent work, hours	102

External requirements

is able to search, critical analysis and synthesis of information, apply a systematic approach to solving the set Tasks; ***regarding the following learning results*:**
The ability to carry out project activities at all stages of the project's life cycle; ***regarding the following learning results*:**
to be able to determine the problem and how to solve it in the project

Requirements for the results of mastering the discipline

The results of the study of the discipline	**Forms of organizing classes**
1. Know the techniques of debugging and manual testing of software.	Lections; Laboratory works; Independent work
to be able to determine the problem and how to solve it in the project	
2. To be able to build a set of tests for testing a complex information system.	Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	**Active forms, hours**	**Hours**	**Links to learning results**	**Learning activities**

Semester: 8				
Didactic unit: Basic concepts of testing				
1. The subject and task of the course. The way to ensure product quality. General concept. Basic terminology. Testing organization. Program specification. Development of tests. Managing graph program. Major testing problems.	1	0,5	1	Lecture.
Didactic unit: Control and regulation of motion on routes				
3. Requirements for the ideal criterion. Criteria classes. Structural criteria. Functional criteria. Stochastic criteria. Mutational criterion.	1	0,5	1	Lecture.
Didactic unit: Testing varieties				
5. testing varieties. Modular testing. Features of integration testing for object-oriented programming. System Testing. Regression testing. Combining test levels.	2	1	1	Lecture.
Didactic unit: Features of industrial testing				
6. Accidents, accidents in the workplace.	2	1	1	Lecture .
Didactic unit: Regression testing				
7. Justification of the correctness of the test view method. Classification of tests during the selection. Opportunities Repeating tests. Classification of selective methods.	2	1	1	Lecture.

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 8				
Didactic unit: Basic concepts of testing				
1. Study of the Specification of		3	1, 2	Laboratory work.
Didactic unit: Control and regulation of motion on routes				
2. Test coating. Building test sets	2	4	1, 2	Laboratory work.
Didactic unit: Testing varieties				
3. Modular testing		4	1, 2	Laboratory work.
4. Integration testing.		4	1, 2	Laboratory work.

5. System Testing.		3	1, 2	Laboratory work.
Didactic unit: Features of industrial testing				
6. Test automation		4	1, 2	Laboratory work.

Table 3.3

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 8				
Didactic unit: Basic concepts of testing				
2. Development of tests. Managing graph program. Basic testing problems.		5	1	Independent work.
Didactic unit: Control and regulation of motion on routes				
4. Assessment of the coverage of the program and the project. Methods of integral assessment of testing.		5	1	self-function.
Didactic unit: Features of industrial testing				
8. characteristics of good test. Load tests.		10	1	Independent work.
Didactic unit: Regression testing				
9. Objectives and objectives of regression testing. Types of regression testing. Controlled regression testing. Justification of the correctness of the test of tests.		15	1	Independent work.
10. Regression testing.		3	1, 2	Laboratory work.

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Specialized software

1 Creating reports for laboratory work. Microsoft Microsoft Office

ANNOTATION OF THE PROGRAM
Computer technologies

Course: 3, semester : 6

		Semester
№	**Kind of activity**	**6**
1	Total credits	3
2	Total hours	108
3	Total classes in the contact form, hours	61
4	Lectures, hours	18
5	Practical lessons, hours	0
6	Laboratory studies, hours	36
7	of them in an active and interactive form, hours	12
8	Consultations, hours	5
9	Independent work, hours	47

External requirements

The ability to conduct research at all stages of the software product life cycle; *regarding the following learning results*:
have the completion skills in accordance with the task received
is able to search, critical analysis and synthesis of information, apply a systematic approach to solving the set Tasks; *regarding the following learning results*:
own: search methods, collection and processing, critical analysis and information synthesis; method of a systematic approach to solving the tasks.
is able to carry out social interaction and implement its role in the command; *regarding the following learning results*:
own: the simplest methods and techniques of social interaction and work in the team.

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes
have the completion skills in accordance with the task received	
1. to be able to plan and organize the simplest experiments, process and analyze the results obtained	Lections; Laboratory works; Independent work
own: search methods, collection and processing, critical analysis and information synthesis; method of a systematic approach to solving the tasks.	
2. Know the technique of creating virtual instruments	Lections; Laboratory works; Independent work
3. To be able to create virtual instruments	Lections; Laboratory works; Independent work

own: the simplest methods and techniques of social interaction and work in the team.	
4. to know the stages of experimental studies	Lections; Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 6				
Didactic unit: General information about computer				
6. Technique of creating, editing and debugging virtual devices.		2	1, 2, 3, 4	Lecture.
Didactic unit: Operating systems				
7. Timeing functions	2	1	1, 2, 3, 4	Lecture.
Didactic unit: Shell programs				
8. Strings and file entry-conclusion		2	1, 2, 3, 4	Lecture.
Didactic unit: Mathematical and modeling programs of general purpose				
1. Introduction to the discipline	2	1	1, 2, 3, 4	Lecture.
Didactic unit: Solving tasks of classification and data clustering				
5. Solving typical tasks of measuring systems	2	2	1, 2, 3, 4	Lecture.
Didactic unit: Structure of control systems with computers. System hierarchy				
9. Virtual Digital Multimeter		2	1, 2, 3, 4	Lecture.
Didactic unit: The calculation scheme of the kinematic chain with elastic bond and gap				
10. Analysis and generation of signals		2	1, 2, 3, 4	Lecture.
Didactic unit: Environment like LabVIEW				
3. Basic concepts LabVIEW	2	1	1, 2, 3, 4	Lecture.
Didactic unit: Document design software				
11. Arrays and clusters		2	1, 2, 3, 4	Lecture.
Didactic unit: End-user software				
2. Graphic data display	2	1	1, 2, 3, 4	Lecture.
4. Structures in LabVIEW	2	2	1, 2, 3, 4	Lecture.

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 6				
Didactic unit: Operating systems				

2. Timeing functions		5	1, 2, 3, 4	Laboratory work.
Didactic unit: Shell programs				
3. Strings and file entry-conclusion		5	1, 2, 3, 4	Laboratory work.
Didactic unit: Mathematical and modeling programs of general purpose				
1. Basic concepts LabVIEW		5	1, 2, 3, 4	Laboratory work.
Didactic unit: Structure of control systems with computers. System hierarchy				
4. Virtual Digital Multimeter		5	1, 2, 3, 4	Laboratory work.
5. Technique of creating, editing and debugging virtual devices		5	1, 2, 3, 4	Laboratory work.
Didactic unit: The calculation scheme of the kinematic chain with elastic bond and gap				
6. Analysis and generation of signals		5	1, 2, 3, 4	Laboratory work.
Didactic unit: Document design software				
7. Arrays and clusters		6	1, 2, 3, 4	Laboratory work.

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Specialized software

1 Microsoft Office Application Pack

2 Wednesday graphic programming means of automating NI LabVIEW

3 Calculator of the cost and timing of the project and its stages according to the COCOMO COCOMO® II.2000.4 methodology

ANNOTATION OF THE PROGRAM
Discrete mathematics

Course: 1, semester : 2

		Semester
№	**Kind of activity**	**2**
1	Total credits	4
2	Total hours	144
3	Total classes in the contact form, hours	61
4	Lectures, hours	18
5	Practical lessons, hours	36
6	Laboratory studies, hours	0
7	of them in an active and interactive form, hours	18
8	Consultations, hours	5
9	Independent work, hours	83

External requirements

The ability to conduct research at all stages of the software product life cycle; ***regarding the following learning results*****:**
have the completion skills in accordance with the task received
is able to determine the range of tasks in the framework of the target and choose the best ways to solve them, based on existing legal norms, resources available and restrictions; ***regarding the following learning results*****:**
to be able to: conduct an analysis of the goal and formulate the tasks that need to be solved to achieve it; analyze alternative options to achieve the outlined results; Use regulatory documentation in the field of professional activity.

Requirements for the results of mastering the discipline

The results of the study of the discipline	**Forms of organizing classes**
have the completion skills in accordance with the task received	
1. on the designs of domestic steam energy and heat turbines and gas turbines.	Lections; Seminars; Independent work
2. About mathematics as a special way of knowledge of the world, the generality of its concepts and ideas	Lections; Seminars; Independent work
3. Basic concepts and methods of discrete mathematics	Lections; Seminars; Independent work
4. Special Terminology Direction Direction	Lections; Seminars
to be able to: conduct an analysis of the goal and formulate the tasks that need to be solved to achieve it; analyze alternative options to achieve the outlined results; Use regulatory documentation in the field of professional activity.	

5. Use basic concepts and methods of discrete mathematics	Lections; Seminars
6. Build mathematical models of simplest systems and processes of natural science and technology	Lections; Seminars; Independent work
7. Conduct the necessary calculations within the framework of the model of the model	Lections; Seminars; Independent work
have the completion skills in accordance with the task received	
8. of consumption of mathematical symbols for the expression and qualitative relationships of objects	Lections; Seminars; Independent work
9. use of the main techniques of statistical processing of experimental data	Lections; Seminars; Independent work
10. Works with operations over algebraic systems	Lections; Seminars; Independent work
11. coding of binary relationships	Seminars
12. Research of models, taking into account their hierarchical structure and assessment of the limits of the applicability of the results obtained	Lections; Seminars
13. Know the main Tools of stabilization policy of the state	Lections; Seminars

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 2				
Didactic unit: Theory of sets.				
1. 1.1. Sets. Main operations on sets 1.2. Many natural numbers 1.3. Sets of binary relationships	4	4	1, 13, 2, 3	
Didactic unit: Algebraic systems				
4. 2.1. Algebraic systems: definition and examples. The concept of a semigroup, monoid, groups, their task using the Cali table. Morphisms of algebraic systems. Subsystems. The terms of signature		4	10, 2, 3, 5, 9	2.1. Algebraic systems. Mi-fisms of algebraic systems. 2.2. Subsystems. The terms of signature
Didactic unit: Computer arithmetic				
2. 2.1. Executive systems 2.2. Solving a linear equation module m.	4	4	4, 5, 6, 7	
Didactic unit: Theoretical foundations of inductive analysis of data				
3. 3.1. Types and ways of setting graphs 3.2. Distance in Grafakh 3.3. Planar graphs	4	4	12, 13, 8, 9	
Didactic unit: Logic algebra				

5. 5.1. Formulas Logic algebra, their truth tables. Boolean functions, ways to task them. Representation of boolean functions by formulas. 5.2. Disjunctive and conjunctive normal forms. Algorithm for bringing the formula to the DNF and the PFF. Shannon theorems. Theorem on functional completeness. Ways to build a SDNF and SCFF. 5.3. Two-element Boulev algebra. The algebra of boolean functions. Factor algebra algebra formulas. Impicants, simple implicants. Abbreviated, dead-end, mini-rally normal forms. The algorithm of Qwaine is conceived by MDNF. Carnation cards. Building MDNF using carno cards. 5.4. The principle of duality. Self-educational functions. Theorem Zhegalkina. Ways to build Zhegalkin polynomials. Linear functions. Freight classes. Full systems of boolean functions, bases. Logical networks. Implementation of Boolean functions with contact circuits and schemes from functional elements.		2	1, 2, 3, 4, 5, 7, 9	5.1. Formulas Logic algebra, their truth tables. Boolean functions, ways to task them. Representation of boolean functions by formulas. 5.2. Disjunctive and conjunctive normal forms. Algorithm for bringing the formula to the DNF and the PFF. Shannon theorems. Theorem on functional completeness. Ways to build a SDNF and SCFF. 5.3. Two-element Boulev algebra. The algebra of boolean functions. Factor algebra algebra formulas. Impicants, simple implicants. Abbreviated, dead-end, mini-rally normal forms. The algorithm of Qwaine is conceived by MDNF. Carnation cards. Building MDNF using carno cards. 5.4. The principle of duality. Self-educational functions. Theorem Zhegalkina. Ways to build Zhegalkin polynomials. Linear functions. Freight classes. Full systems of boolean functions, bases. Logical networks. Implementation of Boolean functions with contact circuits and schemes from functional elements.

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 2				
Didactic unit: Theory of sets.				
1. 1.1. Sets. Main operations on sets 1.2. Many natural numbers 1.3. Sets of binary relationships	2	8	1, 11, 12, 2, 3	
Didactic unit: Algebraic systems				
4. 2.1. Algebraic systems. Mi-fisms of algebraic systems. 2.2. Subsystems. The terms of signature		4	10, 12, 13, 4, 5, 6, 8, 9	1. Electric Transport Depot Design 2. Development of the repair technology of the node or the unit
Didactic unit: Computer arithmetic				
2. 2.1. Executive systems 2.2. Solving a linear equation module m.	4	10	4, 5, 6, 7	
Didactic unit: Theoretical foundations of inductive analysis of data				

3. 3.1. Types and ways of setting graphs 3.2. Distance in Grafakh 3.3. Planar graphs		8	12, 8, 9	
Didactic unit: Logic algebra				
5. 5.1. Formulas Logic algebra, their truth tables. 5.2. Boolean functions, ways to task them. Representation of boolean functions by formulas. Disjunctive and conjunctive normal forms. Algorithm for bringing the formula to the DNF and the PFF. Methods of building a STNF and SCFF. 5.3. Algorithm of Queen building MDNF. Carnation cards. Building MDNF using carno cards. 5.4. Ways to build Zhegalkin polynomials. Freight classes. Full systems of boolean functions, bases. Logical networks. Implementation of Boolean functions with contact circuits and schemes from functional elements.		6	1, 10, 12, 13, 3, 4, 5, 7, 8, 9	5.1. Formulas Logic algebra, their truth tables. 5.2. Boolean functions, ways to task them. Representation of boolean functions by formulas. Disjunctive and conjunctive normal forms. Algorithm for bringing the formula to the DNF and the PFF. Methods of building a STNF and SCFF. 5.3. Algorithm of Queen building MDNF. Carnation cards. Building MDNF using carno cards. 5.4. Ways to build Zhegalkin polynomials. Freight classes. Full systems of boolean functions, bases. Logical networks. Implementation of Boolean functions with contact circuits and schemes from functional elements.

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Specialized software

1 Calculator of the cost and timing of the project and its stages according to the COCOMO COCOMO® II.2000.4 methodology

2 Microsoft Office Application Pack

ANNOTATION OF THE PROGRAM
Signals and systems

Course: 3, semester : 6

		Semester
№	**Kind of activity**	**6**
1	Total credits	4
2	Total hours	144
3	Total classes in the contact form, hours	101
4	Lectures, hours	36
5	Practical lessons, hours	18
6	Laboratory studies, hours	36
7	of them in an active and interactive form, hours	18
8	Consultations, hours	9
9	Independent work, hours	43

External requirements

The ability to conduct research at all stages of the software product life cycle; ***regarding the following learning results*:**
have the completion skills in accordance with the task received
is able to search, critical analysis and synthesis of information, apply a systematic approach to solving the set Tasks; ***regarding the following learning results*:**
To be able to: apply search, collection and information processing techniques; Creit analysis and synthesis of information obtained from different sources; Apply the system approach to solve the tasks set.

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes
To be able to: apply search, collection and information processing techniques; Creit analysis and synthesis of information obtained from different sources; Apply the system approach to solve the tasks set.	
1. Know the presentation of periodic signals near Fourier, direct and reverse discrete transformations Fourier, their properties	Lections; Seminars; Laboratory works; Independent work
2. Know Methods and Computer Graphics and Geometrical Modeling Means, graphic packages for creating object models, principles of organization, technical means of computer graphics systems, basic methods and formation algorithms and converting images	Lections; Independent work
3. to know the definition and calculation of the continuous and discrete convolution	Lections; Seminars; Laboratory works; Independent work

4. Know the basics of analyzing linear continuous systems in the temporary, frequency and complex plane	Lections; Laboratory works; Independent work
have the completion skills in accordance with the task received	
5. to be able to calculate the spectra of continuous periodic, Interiodical and discrete signals	Seminars; Laboratory works; Independent work
6. to be able to find direct OE and reverse z - signals converting, including using MATLAB	Lections; Seminars; Laboratory works; Independent work
7. To be able to apply mathematical methods when solving professional signal processing tasks	Lections; Seminars; Laboratory works; Independent work
8. To be able to design filters with a finite pulse characteristic, as well as with Infinite pulse characteristic	Lections; Seminars; Laboratory works; Independent work
To be able to: apply search, collection and information processing techniques; Creit analysis and synthesis of information obtained from different sources; Apply the system approach to solve the tasks set.	
9. to know the content and region Applications of signal processing tasks	Lections; Seminars; Laboratory works; Independent work
have the completion skills in accordance with the task received	
10. To be able to design digital filters using MATLAB	Lections; Laboratory works; Independent work
11. To be able to use computer technologies for processing research results and drawing up a report	Laboratory works; Independent work
To be able to: apply search, collection and information processing techniques; Creit analysis and synthesis of information obtained from different sources; Apply the system approach to solve the tasks set.	
12. to know the components of software and technical architectures, existing applications and interfaces of interaction with them	Lections; Independent work
13. to know the basis for analyzing linear discrete systems in the temporary , frequency and complex plane,	Lections; Seminars; Laboratory works
14. to know the concept, characteristics and main stages of the innovation process	Lections; Independent work
15. have an idea of ??the spectral analysis of continuous and discrete signals	Lections; Seminars; Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 6				
Didactic unit: Wandering rail networks and protecting underground structures from electrocorrosion				
1. Signals and their characteristics. Tasks and course content. The concept of signal and system. Signal classification. Energy, power and autocorrelation signal function. Special (basic) signals.		3	1, 9	Lecture. Study of theoretical material. Solving exercise.
Didactic unit: Spectral representations of continuous periodic and non-periodic signals				
2. Fourier Rows. Fourier transformation. Spectra of periodic and non-periodic signals.		4	1, 15, 7	Lecture. Study of theoretical material.
Didactic unit: Algorithms for the functioning of modern digital means of automation power systems				

3. Analysis of linear continuous systems (LNS) in the time and frequency domain. Analysis of LNS in the time domain. Integral convolution. Frequency characteristics of LNS. System system for a harmonic input. Frequency-selective filters.		4	2, 3, 4	Lecture. Study of theoretical information. Solving exercise.
Didactic unit: Basics of analysis of linear discrete systems				
4. Z-conversion. Communication Z-conversion and Laplace transform. Properties Z-conversion. Reverse (inverse) z conversion.		4	6	Lecture. Study of theoretical information. Consideration of examples.
5. Discrete-temporal Fourier transformation.		4	12, 15, 2, 6	Lecture. Study of the integration information. Solution of examples.
6. Analysis of linear discrete systems (LDS). Linear difference equations with constant coefficients. Transfer function of a linear discrete system (LDS). Poles and zeros of a linear discrete system. Frequency characteristics LDS.		4	13, 3	Lecture. Study of theoretical material. Consideration of examples.
Didactic unit: Methods of design (synthesis) of digital filters				
7. Filters: Basic information. Purpose, types and characteristics of filters. Digital filters: general information and classification. Ideal digital filters. Classic filters. Batterworth filters, Chebyshev, elliptical filters, Bessel filters.		5	7, 9	lecture. Studying the basic concepts on the analysis and synthesis of filters.
8. Synthesis of filters with a finite pulse characteristic (kih filters). Designing Filters by the method of decomposition of frequency response in a row of Fourier. Designing kih filters by weighing windows. Design of optimal Chebyshev kih filters. Synthesis of kih filters in Matlab environment.	1	4	10, 14, 8	Lecture. Studying the theoretical foundations and methods of designing kih filters.

9. Synthesis of filters with infinite pulse characteristic (BIH filters). Design methods BiX filters (review). Bilinear conversion. An example of designing a digital FGH using bilinear conversion. Frequency transformations of BIH filters. Design of optimal BIH filters.	2	4	10, 7, 8	Lecture. Studying methods for synthesis Bih filters.

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 6				
Didactic unit: Wandering rail networks and protecting underground structures from electrocorrosion				
1. Continuous and discrete time signals.	1	4	7, 9	Laboratory work. Sign with Matlab. Exercises on the view of signals and calculations in MATLAB.
Didactic unit: Spectral representations of continuous periodic and non-periodic signals				
2. Calculations of the spectra of periodic signals in Matlab environment	1	4	1, 11, 5	Laboratory work. Studying work in Matlab environment. Development of procedures. Calculations.
3. Determining the spectra of non-periodic signals in the MATLAB environment.	1	4	1, 11, 15, 5	Laboratory work. Study of the functions for calculating the spectra in Matlab. Calculations. Analysis of the results.
Didactic unit: Algorithms for the functioning of modern digital means of automation power systems				
4. Continuous and discrete convolution.	1	4	11, 3, 4	Laboratory work. Study of special MATLAB functions. Software development. Analysis of the results.
5. Linear Continuous Stationary Systems.	1	4	11, 4	Laboratory work. Development of software procedures for analyzing linear continuous systems. Analysis of results.
Didactic unit: Basics of analysis of linear discrete systems				
6. Z-conversion and discrete-temporary Fourier transformation.	1	4	11, 6	Laboratory work. Study of special MATLAB functions. Perform computing and analysis in MATLAB.
7. Linear discrete (digital) systems.	1	4	11, 13, 3	Laboratory work. Perform computing and analysis in Matlab environment.
Didactic unit: Methods of design (synthesis) of digital filters				
8. Digital filters with a finite pulse characteristic.	1	4	11, 8	Laboratory work. Designing the FIR filter using Matlab tools. Perform signal filtering.

9. Digital filters with an infinite pulse characteristic.	1	4	10, 11, 7	Laboratory work. Designing a BiX filter in the MATLAB environment for an individual task.

Table 3.3

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 6				
Didactic unit: Wandering rail networks and protecting underground structures from electrocorrosion				
1. Transformations and characteristics of signals.	1	2	7, 9	Practice. Solving tasks and exercises.
Didactic unit: Spectral representations of continuous periodic and non-periodic signals				
2. Spectra of deterministic periodic signals	1	2	1, 5	Practice. Solving tasks and exercises.
3. Spectra of analog non-periodic signals.	1	2	15, 5	Practice. Solving tasks and exercises.
Didactic unit: Algorithms for the functioning of modern digital means of automation power systems				
4. Continuous and discrete convolution.	1	2	3	Practice. Solving tasks and exercises.
Didactic unit: Basics of analysis of linear discrete systems				
5. Windows API	1	4	6	Practice. Solving tasks and exercises to calculate Z-Bersion and DVPF.
6. Analysis of linear discrete systems in the frequency and z-area.	1	2	13, 6	Practice. Solving tasks and exercises.
Didactic unit: Methods of design (synthesis) of digital filters				
7. Structures of kih filters.		2	8	Practice. Analysis of the structures of the implementation of kih filters.
8. Structures of BIH filters.		2	8	Practice. Analysis of various forms of implementing BIH filters.

Table 3.4

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 6				
Didactic unit: Wandering rail networks and protecting underground structures from electrocorrosion				
1. Basics of representation and analysis of signals.		5	11, 7, 9	Independent work. Study of theoretical material.
Didactic unit: Spectral representations of continuous periodic and non-periodic signals				
2. Spectral representations of signals.		6	1, 11, 15, 5	independent work. Study of theoretical information.
Didactic unit: Algorithms for the functioning of modern digital means of automation power systems				
3. Analysis of linear continuous stationary systems.		4	11, 3, 4, 7	Independent work. Study of theoretical material.

Didactic unit: Basics of analysis of linear discrete systems				
4. Analysis of linear discrete systems.		5	10, 11, 8	Independent work. Study of theoretical material.

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2. Пасечников, И. И. Цифровая обработка сигналов : учебное пособие / И. И. Пасечников. — Тамбов : ТГУ им. Г.Р.Державина, 2019. — 156 с. — ISBN 978-5-00078-261-3. — Текст : электронный // Лань : электронно-библиотечная система. — URL: https://e.lanbook.com/book/137567 (дата обращения: 04.03.2021). — Режим доступа: для авториз. пользователей.

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4. http://www.iprbookshop.ru/

5. Щетинин, Ю. И. Анализ и обработка сигналов в среде MATLAB : [учебное пособие по курсу «Теория и обработка сигналов» для 3 курса АВТФ направлений 200100 «Приборостроение», 230400 «Информационные системы и технологии», 201000 «Биотехнические системы и технологии»] / Ю. И. Щетинин. – Текст : электронный // Электронно-библиотечная система НГТУ. – Новосибирск, 2011. – URL: https://elibrary.nstu.ru/source?id=14896 (дата обращения: 26.02.2021). – Режим доступа: для авториз. пользователей.

6. http://znanium.com/

Methodical support and software

Methodological support

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2. Щетинин Ю. И. Анализ и обработка сигналов в среде MATLAB : [учебное пособие по курсу "Теория и обработка сигналов" для 3 курса АВТФ направлений 200100 "Приборостроение", 230400 "Информационные системы и технологии", 201000 "Биотехнические системы и технологии"] / Ю. И. Щетинин ; Новосиб. гос. техн. ун-т. - Новосибирск, 2011. - 112, [2] с. : ил.. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000159993

Specialized software

1 Scientific and Technical Computing Program Mathworks Matlab

ANNOTATION OF THE PROGRAM
Measuring Information Systems

Course: 4, semester : 7

		Semester
№	**Kind of activity**	**7**
1	Total credits	5
2	Total hours	180
3	Total classes in the contact form, hours	82
4	Lectures, hours	36
5	Practical lessons, hours	0
6	Laboratory studies, hours	36
7	of them in an active and interactive form, hours	18
8	Consultations, hours	8
9	Independent work, hours	98

External requirements

The ability to conduct research at all stages of the software product life cycle; ***regarding the following learning results*****:**
to know about the features of the project planning in accordance with the task received
is able to determine the range of tasks in the framework of the target and choose the best ways to solve them, based on existing legal norms, resources available and restrictions; ***regarding the following learning results*****:**
to be able to: conduct an analysis of the goal and formulate the tasks that need to be solved to achieve it; analyze alternative options to achieve the outlined results; Use regulatory documentation in the field of professional activity.
The ability to carry out project activities at all stages of the project's life cycle; ***regarding the following learning results*****:**
to be able to determine the problem and how to solve it in the project

Requirements for the results of mastering the discipline

The results of the study of the discipline	**Forms of organizing classes**
to know about the features of the project planning in accordance with the task received	
1. to know the main types of renewable sources of electrical energy and the methods of its accumulation, advantages and disadvantages of individual species, appropriate application	Lections; Laboratory works; Independent work
2. to know the principles of designing software IIS	Lections; Laboratory works; Independent work
3. To be able to design the functional blocks of systems	Lections; Laboratory works; Independent work

4. Know the basic elements of the IIS and their technical characteristics	Lections; Laboratory works; Independent work
5. Know about the characteristics of the main components of the IIS	Lections; Laboratory works; Independent work
to be able to: conduct an analysis of the goal and formulate the tasks that need to be solved to achieve it; analyze alternative options to achieve the outlined results; Use regulatory documentation in the field of professional activity.	
6. to know about the structures of the IIS	Lections; Laboratory works; Independent work
7. to know about the algorithms of the work of IIS	Lections; Laboratory works; Independent work
8. Functions performed in the measuring systems.	Lections; Laboratory works; Independent work
to be able to determine the problem and how to solve it in the project	
9. to be able to evaluate, design, create and apply iis	Lections; Laboratory works; Independent work
10. Know the basic scientific and technical problems, the principles of building IIS	Lections; Laboratory works; Independent work
11. to know about the prospects for the development of IIS	Lections; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 7				
Didactic unit: Architecture IIS.				
1. Measuring information systems. Main definitions, varieties, tasks.		2	11, 8	Lecture.
Didactic unit: Basic technical and metrological characteristics of systems				
2. speed and noise immunity of measuring systems.		2	10, 4, 5, 8	Lecture.
Didactic unit: Error correction algorithms.				
3. Algorithms for increasing measurement accuracy.		2	1, 10, 4, 7	Lecture.
Didactic unit: Monitoring systems.				
4. Control - basic definitions and tasks. Classification of control systems.		3	10, 11, 5, 7, 8, 9	Lecture.
Didactic unit: Control errors.				
5. Control errors, the nature of the occurrence of errors.		3	10, 11, 5, 7, 8, 9	Lecture.
Didactic unit: Models of diagnostic objects.				
6. Technical diagnostics. Main propellations. Types of errors and sobs. Models of diagnostic objects.		3	1, 10, 3, 4, 5, 6, 8, 9	Lecture.
Didactic unit: structure of diagnostic systems.				
7. Functional and test diagnostics systems.		3	1, 10, 3, 4, 5, 6, 8, 9	Lecture.
Didactic unit: Table of fault functions. Synthesis of tests.				

8. Software feature table. A combination of navigating and patching pins.		3	1, 10, 3, 4, 5, 6, 8, 9	Lecture.
Didactic unit: Testing microprocessor systems.				
9. Tests of testing of micpoprotypes. Test methods.		3	10, 4	Lecture.
Didactic unit: Signal Analysis.				
10. Alarm analysis.		3	1, 6, 7	Lecture.
Didactic unit: Heat conductivity				
11. Analysis of logical states.		3	1, 10, 2, 3, 4, 5, 6, 7, 8, 9	Lecture.
12. Built-in control. Principles for the design of test devices and systems.		3	1, 10, 3, 4, 5, 6, 7, 8, 9	Lecture.
Didactic unit: Model of distributed information processing; Information flow routing methods;				
13. Technical means of measuring information systems. Software for designing IIS.		3	1, 10, 11, 2, 3, 9	Lecture.

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 7				
Didactic unit: Model of distributed information processing; Information flow routing methods;				
1. Explorer in the measurement and automation environment.	2	4	1, 10, 2, 3, 4, 5, 6, 7, 8, 9	Laboratory work.
2. Measurement of analog values.	4	2	1, 10, 3, 4, 5, 6, 7, 8, 9	Laboratory work.
3. Generation of analog signals.	2	2	1, 10, 2, 3, 4, 5, 6, 7, 8, 9	Laboratory work.
4. Generation of digital signals.	2	4	1, 10, 2, 3, 4, 5, 6, 7, 8, 9	Laboratory work.
5. Collecting Digital Data.	2	4	1, 10, 2, 3, 4, 5, 6, 7, 8, 9	Laboratory work.
6. Measurement of pulse signals.	4	4	1, 10, 2, 3, 4, 5, 6, 7, 8, 9	Laboratory work.
7. Measuring non-electrical values		4	1, 10, 2, 3, 4, 5, 6, 7, 8, 9	Laboratory work.
8. Generation of pulse signals.	2	4	1, 10, 2, 3, 4, 5, 6, 7, 8, 9	Laboratory work.
Didactic unit: Modular systems				
9. Systems on the PXI platform		4	1, 10, 2, 3, 4, 5, 6, 7, 8, 9	Laboratory work.
10. Systems on the CDAQ platform		4	1, 10, 2, 3, 4, 5, 6, 7, 8, 9	Laboratory work.

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Methodical support and software

Methodological support

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Specialized software

1 Microsoft Office Application Pack

2 Wednesday graphic programming means of automating NI LabVIEW

3 Calculator of the cost and timing of the project and its stages according to the COCOMO COCOMO® II.2000.4 methodology

ANNOTATION OF THE PROGRAM
Computer Graphics

Course: 2, semester ы : 3 4

		Semester	
№	**Kind of activity**	**3**	**4**
1	Total credits	4	4
2	Total hours	144	144
3	Total classes in the contact form, hours	63	60
4	Lectures, hours	18	18
5	Practical lessons, hours	0	0
6	Laboratory studies, hours	36	36
7	of them in an active and interactive form, hours	5	3
8	Consultations, hours	7	4
9	Independent work, hours	81	84

External requirements

The ability to conduct research at all stages of the software product life cycle; ***regarding the following learning results*****:**
have the completion skills in accordance with the task received
to know about the features of the project planning in accordance with the task received
is able to search, critical analysis and synthesis of information, apply a systematic approach to solving the set Tasks; ***regarding the following learning results*****:**

Requirements for the results of mastering the discipline

The results of the study of the discipline	**Forms of organizing classes**
have the completion skills in accordance with the task received	
1. To be able to refine the control algorithms, taking into account the real factors unaccounted In the original model	Lections; Laboratory works; Independent work
2.To be able to use graphic standards and libraries	Lections; Laboratory works; Independent work
to know about the features of the project planning in accordance with the task received	
3. Know the features of the implementation of computer graphics algorithms using a computer	Lections; Laboratory works; Independent work
4. Know the basic models of systems	Lections; Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 3				
Didactic unit: Basics of analytical geometry				
1. Fundamentals of analytical geometry.		2	4	Lecture.
Didactic unit: Introduction to computer graphics				
2. Main tasks of computer graphics.		2	4	Lecture.
Didactic unit: Development of the GUI in Java				
3. Drawing segments		2	2, 3, 4	Lecture.
4. Elimination of speed. Drawing curves of lines.		2	2, 3, 4	Lecture.
5. Clipping and filling areas.		2	1, 2, 3, 4	Lecture.
Didactic unit: Building three-dimensional objects				
6. Setting Objects.		2	1, 2, 3, 4	Lecture.
7. Geometric transformations.		2	3, 4	Lecture.
8. Removing invisible lines.		2	1, 2, 3, 4	Lecture.
9. lighting. Perspective.		2	1, 2, 3, 4	Lecture.
Semester: 4				
Didactic unit: Burning of water flow fuels.				
10. Graphic systems.		2	2, 4	Lecture.
11. Generations of graphic accelerators.		2	2, 3	Lecture.
12. GPU architecture.		3	3, 4	Lecture.
Didactic unit: Languages ??of a description of three-dimensional objects				
13. Language of descriptions of VRML objects.		2	2, 3, 4	Lecture.
14. Description language of three-dimensional objects x3d.		3	2, 3, 4	Lecture.
Didactic unit: Software Interfaces				
15. Introduction to OpenGL.		2	2, 3, 4	Lecture.
16. Introduction to DirectX.		2	1, 2, 3, 4	Lecture.
17. Introduction to WebGl.		2	1, 2, 3, 4	Lecture.

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 3				
Didactic unit: Technological process TPP as a control object				
1. Graphic primitives.	1	5	1, 2, 3, 4	Laboratory work.
2. Drawing lines.	1	5	1, 2, 3, 4	Laboratory work.
3. Drawing circles.	1	5	1, 2, 3, 4	Laboratory work.
4. Filling triangles.		5	1, 2, 3, 4	Laboratory work.
5. Filling of polygons.	2	5	1, 2, 3, 4	Laboratory work.
6. Filling Figures with seed.		5	1, 2, 3, 4	Laboratory work.
7. Shift, scaling, rotation of two-dimensional figures.		6	1, 2, 3, 4	Laboratory work.
Semester: 4				
Didactic unit: Software Interfaces				
8. Cube task in the form of a dot set in OBJ format. Rotation relative to the center. Move. Scaling.		9	1, 2, 3, 4	Laboratory work.
Didactic unit: Graphic Systems Development Technology				

9. capturing solids from chimneys of TPPs. Characteristics of fly ash. Basics of the theory of goldening: the fractional composition of the ash of undertaking some fuel; Impactors to determine the dispersion composition of ash; degree of capture in the devices of the goldening; The effect of electrical resistance to the degree of capture in electrofilm The effect of sticking, wettability, the presence of Cao in ash by the degree of capture; Sklock ash through a zone; the zowing parameter n; The dependence of the degree of slippery and capture from the rowing parameter. Types and characteristics of ashors. Inertial ashors: cyclones; Battery cyclones. Calculation of inertial ashors. Louvrug dust collectors, vortex dust collectors, reflective inertial dust collectors, rotary dust collectors. Wet ashors: centrifugal scrubber, coagulator Venturi. Calculation of wet ashors. Electrofiltra. The principle and features of the electrofilter work on the example of the UG type apparatus. EGA series electrostatic filters.	2	9	1, 2, 3, 4	Laboratory work.
10. Removal of invisible lines by the floating horizon method.	1	9	1, 2, 3, 4	Laboratory work.
11. Removing invisible lines by z-buffer		9	1, 2, 3, 4	Laboratory work.

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Methodological support

1. Веретельникова Е. Л. Компьютерная графика [Электронный ресурс]. Часть 1 : электронный учебно-методический комплекс / Е. Л. Веретельникова ; Новосиб. гос. техн. ун-т. - Новосибирск, [2011]. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000155705. - Загл. с экрана.

Specialized software

1 Operating System Microsoft Windows

2 Simulation Transport networks and PTV PTV PTV Visum PasteProst

ANNOTATION OF THE PROGRAM

Robotic systems and complexes

Course: 4, semester : 7

		Semester
№	**Kind of activity**	**7**
1	Total credits	4
2	Total hours	144
3	Total classes in the contact form, hours	37
4	Lectures, hours	8
5	Practical lessons, hours	0
6	Laboratory studies, hours	18
7	of them in an active and interactive form, hours	24
8	Consultations, hours	9
9	Independent work, hours	107

External requirements

The ability to conduct research at all stages of the software product life cycle; ***regarding the following learning results*****:**
have the completion skills in accordance with the task received
is able to carry out social interaction and implement its role in the command; ***regarding the following learning results*****:**
is able to manage their time, build and implement a self-development trajectory based on the principles of education throughout life; ***regarding the following learning results*****:**
To be able to: Effectively plan and control your own time; Use the methods of self-regulation, self-development and self-study.

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes
have the completion skills in accordance with the task received	
1.To have an idea of ??the development of leading global companies in the field of robotics. The history of the development of world and domestic robotics.	Lections; Laboratory works; Independent work
2. to have an idea of ??the trend in Russia	Lections; Laboratory works; Independent work
3. Have experience of synthesis and analysis of robotic systems and their main functional components.	Laboratory works; Independent work

4. Know the basic functional components of robotic systems and their conditional designations.	Lections; Laboratory works; Independent work
5. Knowing ways and means of management of robotic systems.	Lections; Laboratory works; Independent work
6. Know the basics of designing robotic systems.	Lections; Laboratory works; Independent work
7. To be able to communicate with colleagues and in the scientific, industrial and public sector	Lections; Laboratory works; Independent work
To be able to: Effectively plan and control your own time; Use the methods of self-regulation, self-development and self-study.	
8. To be able to use technical reports. funds for creating information networks	Laboratory works; Independent work
9. to be able to develop and analyze robotic system management systems.	Lections; Laboratory works; Independent work
10. To be able to develop mathematical models of robotic systems.	Lections; Laboratory works; Independent work
11. Knowing ways to implement information systems	Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 7				
Didactic unit: Robotic System.				
1. The purpose and objective of the discipline. Its relationship with other disciplines of the curriculum.		0,5	2, 6	Lecture.
2. Basic definitions and concepts.		0,5	4, 6	Lecture
3. The main stages and trends of the development of robotics.		0,5	1, 2	Lecture
4. Classification of pulse converters. Methods forced switching of thyristors.		0,5	1, 5	Lecture
Didactic unit: Basic components of robotic systems.				
5. rangefinders and locators. Inertial measuring sensory systems. Orbital information systems.		0,5	10, 4	Lecture
6. Multisensory systems. Methods for integration and interpretation of sensory data.		0,5	4	Lecture
7. Application of drives in robototechnical systems. Classification of individual types of drives. Mini and microsening.		1	10, 4, 5	Lecture
Didactic unit: Designing robotic systems.				
8. Stages of design of RTS.		1	4, 5, 6, 7	Lecture
9. Means of design.		1	5, 6, 7	Lecture
Didactic unit: Automatic and automated control of manipulation and trajectory movements.				

10. Methods of managing manipulators.		1	10, 5, 9	Lecture
11. Methods for controlling the movement of mobile robots.		1	10, 5, 9	Lecture

Table 3.2

Themes	**Active forms, hours**	**Hours**	**Links to learning results**	**Learning activities**
Semester: 7				
Didactic unit: Basic components of robotic systems.				
3. Optical quadrature encoder.	2	2	1, 10, 2, 3, 4, 6, 7, 8	Laboratory work.
4. Ultrasonic sensor. Designing an ultrasonic sensor ..	2	2	1, 2, 3, 4, 6, 7	Laboratory work.
Didactic unit: Designing robotic systems.				
1. Acquaintance with the LabVIEW ROBOTICS module.	2	2	1, 11, 2, 5, 6, 7, 8	Laboratory work. Acquaintance with the possibilities of designing and developing a mobile robot control system based on the NI Robotics Starter Kit 2.0 platform in the LabVIEW environment using the LabView Robotics Module library and mastering the project creation and debugging procedure
5. Building a cartographic model of an external environment of a mobile robot.	6	2	1, 10, 2, 6, 7	Laboratory work. To study the methods and software buildings to build a mobile robot of the cartographic model of the external environment and its visualization on the operator's console.
Didactic unit: Automatic and automated control of manipulation and trajectory movements.				
2. Kinematic model of a mobile robot with differential wheel drive.	4	4	1, 10, 11, 3, 5, 6, 8, 9	Laboratory work. Studying the basic principles of control of DC electric motors and the kinematic model of a mobile robot with a differential wheel drive.
6. Planning the trajectory of motion of the mobile robot.	8	6	1, 10, 2, 3, 6, 7, 8, 9	Laboratory work. Examine the heuristic methods for finding the path on the graphs and software tools for their implementation.

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4. http://www.iprbookshop.ru/

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Methodical support and software

Methodological support

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Specialized software

1 Calculator of the cost and timing of the project and its stages according to the COCOMO COCOMO® II.2000.4 methodology

2 Wednesday graphic programming means of automating NI LabVIEW

3 Microsoft Office Application Pack

ANNOTATION OF THE PROGRAM

Theory of algorithms

Course: 2, semester : 4

		Semester
№	**Kind of activity**	**4**
1	Total credits	4
2	Total hours	144
3	Total classes in the contact form, hours	63
4	Lectures, hours	18
5	Practical lessons, hours	0
6	Laboratory studies, hours	36
7	of them in an active and interactive form, hours	12
8	Consultations, hours	7
9	Independent work, hours	81

External requirements

The ability to conduct research at all stages of the software product life cycle; ***regarding the following learning results*****:**
to know about the features of the project planning in accordance with the task received
is able to determine the range of tasks in the framework of the target and choose the best ways to solve them, based on existing legal norms, resources available and restrictions; ***regarding the following learning results*****:**
to be able to: conduct an analysis of the goal and formulate the tasks that need to be solved to achieve it; analyze alternative options to achieve the outlined results; Use regulatory documentation in the field of professional activity.

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes
to know about the features of the project planning in accordance with the task received	
1. Know the basic concepts and types of algorithms	Lections; Laboratory works; Independent work
to be able to: conduct an analysis of the goal and formulate the tasks that need to be solved to achieve it; analyze alternative options to achieve the outlined results; Use regulatory documentation in the field of professional activity.	
2. To be able to apply algorithms for solving professional tasks	Lections; Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 4				
Didactic unit: Analysis of the complexity of algorithms.				
1. Analysis of the complexity of algorithms	1	4	1	Lecture.
Didactic unit: Trees.				
2. Trees. Trees-Views.		5	1, 2	Lecture.
Didactic unit: Graphs.				
3. Graphs.	1	3	1, 2	Lecture.
4. Search for the shortest paths in the column	2	2	1, 2	Lecture.
Didactic unit: The complexity of the operation of the algorithms.				
5. Indicators of the complexity of algorithms. The directions of assessing the complexity of algorithms and their individual components.		2	1, 2	Lecture.
6. Classification of methods for assessing the complexity of algorithms.		2	1, 2	Lecture.

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 4				
Didactic unit: Analysis of the complexity of algorithms.				
1. Analysis of the complexity of the best, worst and average case of algorithms	2	4	1	Laboratory work number 1.
2. Development and construction of block diagrams of a branching structure		4	1, 2	Laboratory work number 2.
Didactic unit: Trees.				
3. Trees	2	4	1, 2	Laboratory work number 3.
4. Trees-Views.	2	4	1, 2	Laboratory work number 4.
Didactic unit: Graphs.				
5. Search for the shortest paths in the graph.	1	4	1, 2	Laboratory work number 5.
6. Concept of graph.	1	4	1, 2	Laboratory work number 6.
Didactic unit: The complexity of the operation of the algorithms.				

7. "Comparison of the methods for assessing the complexity of the algorithms".		4	1, 2	Laboratory work number 7.
8. Criteria and indicators of complexity of algorithms.		4	1, 2	Laboratory Rabolota №8.
9. Analysis of sorting algorithms		4	1, 2	Laboratory work number 9.

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Main literature

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Methodical support and software

Methodological support

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Specialized software

1 Calculator of the cost and timing of the project and its stages according to the COCOMO COCOMO® II.2000.4 methodology

2 Microsoft Office Application Pack

ANNOTATION OF THE PROGRAM
Optimization methods

Course: 3, semester : 5

		Semester
№	**Kind of activity**	**5**
1	Total credits	4
2	Total hours	144
3	Total classes in the contact form, hours	61
4	Lectures, hours	36
5	Practical lessons, hours	18
6	Laboratory studies, hours	0
7	of them in an active and interactive form, hours	18
8	Consultations, hours	5
9	Independent work, hours	83

External requirements

The ability to conduct research at all stages of the software product life cycle; ***regarding the following learning results*****:**
have the completion skills in accordance with the task received
is able to search, critical analysis and synthesis of information, apply a systematic approach to solving the set Tasks; ***regarding the following learning results*****:**
own: search methods, collection and processing, critical analysis and information synthesis; method of a systematic approach to solving the tasks.

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes
have the completion skills in accordance with the task received	
1. to be able to apply the main methods of the theory of optimization in tasks Selection of solutions	Lections; Seminars; Independent work
2. To be able to interpret and analyze the results of solving optimization tasks	Lections; Seminars; Independent work
3. To be able to justify the choice of the optimization method and select adequate optimization models for the objects of professional activity	Lections; Seminars; Independent work
4. to know the advantages and disadvantages of various options for the performance of parts and components of mechanical equipment	Lections; Seminars; Independent work

5. Know the basic concepts, models and Methods of optimization theory	Lections; Seminars; Independent work
6. Know the classification of models of optimization	Lections; Seminars; Independent work
own: search methods, collection and processing, critical analysis and information synthesis; method of a systematic approach to solving the tasks.	
7. To be able to solve optimization tasks with various methods	Lections; Seminars; Independent work
8. To be able to work on the task of small groups	Lections; Seminars; Independent work
9. to know the optimization tasks of the slave distribution from	Lections; Seminars; Independent work
have the completion skills in accordance with the task received	
10. To be able to use typical and build original optimization models	Lections; Seminars; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 5				
Didactic unit: The history of the development and basic concepts of the theory of optimization				
1. The history of the Android operating system. Android platform architecture. Overview of programming environments. Emulators. Standard Android emulator. Alternative emulators. The possibilities of debugging on real devices.		2	4, 5	Lecture.
Didactic unit: Mathematical foundations of the theory of optimization				
2. Mathematical foundations of the theory of optimization.		6	4, 5, 6	Lecture.
Didactic unit: Models and methods of linear programming (LP)				
3. Mathematical formulation of the problem of LP. Duality in LP.		6	1, 10, 2, 4, 5, 6, 7, 9	Lecture.
5. Transport task. Staging and methods of solution.		4	1, 2, 4, 5, 7, 9	Lecture.
6. Linear programming methods, simplex-method.		4	1, 10, 2, 7	Lecture.
Didactic unit: Models and methods of discrete programming (DP)				
7. Setting the DP problem. The overall characteristics of the solution methods.		4	1, 10, 2, 3, 4, 5, 6, 7, 8, 9	Lecture.
Didactic unit: Typical optimization models				
8. Model optimization models.		4	1, 10, 3, 5, 6, 7, 9	Lecture.
Didactic unit: Models and methods of nonlinear programming (NLP)				
9. Models and nonlinear programming methods (NLP).		6	1, 10, 3, 4, 5, 6, 7, 9	Lecture.

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 5				
Didactic unit: Mathematical foundations of the theory of optimization				
1. Training: Convex sets and convex functions	2	2	1, 2, 3, 4, 5, 7, 8	Practice .
Didactic unit: Models and methods of linear programming (LP)				
2. Transport task. Staging and methods of solving	2	2	1, 10, 2, 4, 5, 6, 7, 9	Practice .
3. Building LP models.	4	4	1, 10, 3, 4, 5, 7, 8, 9	Practice .
4. Linear programming methods, simplex-method.	4	4	1, 10, 2, 7	Practice .
Didactic unit: Models and methods of discrete programming (DP)				
5. Branch and boundaries for the TSLP task	2	2	1, 10, 2, 4, 7, 8, 9	Practice .
6. The method of branches and boundaries for the task of the commivoymer.	2	2	1, 2, 3, 4, 7, 8, 9	Practice .
Didactic unit: Models and methods of nonlinear programming (NLP)				
7. Nonlinear programming methods (NLP).	2	2	1, 10, 3, 4, 5, 6, 7, 9	Practice .

Table 3.3

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 5				
Didactic unit: The history of the development and basic concepts of the theory of optimization				
1. The history of the Android operating system. Android platform architecture. Overview of programming environments. Emulators. Standard Android emulator. Alternative emulators. The possibilities of debugging on real devices.		2	4, 5	Independent work.
Didactic unit: Typical optimization models				
10. Typical optimization models		4	1, 10, 3, 5, 6, 7, 9	Independent work.
Didactic unit: Models and methods of nonlinear programming (NLP)				
11. Models and methods of nonlinear programming (NLP)		4	1, 10, 2, 3, 4, 5, 6, 7, 8, 9	Independent work.

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Specialized software

1 Calculator of the cost and timing of the project and its stages according to the COCOMO COCOMO® II.2000.4 methodology

2 Microsoft Office Application Pack

ANNOTATION OF THE PROGRAM
Industrial automation

Course: 3, semester : 5

		Semester
№	**Kind of activity**	**5**
1	Total credits	4
2	Total hours	144
3	Total classes in the contact form, hours	61
4	Lectures, hours	36
5	Practical lessons, hours	18
6	Laboratory studies, hours	0
7	of them in an active and interactive form, hours	18
8	Consultations, hours	5
9	Independent work, hours	83

External requirements

The ability to conduct research at all stages of the software product life cycle; ***regarding the following learning results*:**
have the completion skills in accordance with the task received
is able to search, critical analysis and synthesis of information, apply a systematic approach to solving the set Tasks; ***regarding the following learning results*:**
own: search methods, collection and processing, critical analysis and information synthesis; method of a systematic approach to solving the tasks.

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes
have the completion skills in accordance with the task received	
1. To be able to build mathematical models for choosing a solution	Lections; Seminars; Independent work
2. to be able to interpret the solutions selection models and justify their construction	Lections; Seminars; Independent work
3. Be able to program mobile applications	Lections; Seminars; Independent work
4. to know the methods and techniques for formalizing the tasks of choosing solutions	Lections; Seminars; Independent work

5. Know the basic concepts of system analysis	Lections; Seminars; Independent work
6. to know the foundations of the theory of systems and system analysis	Lections; Seminars; Independent work
own: search methods, collection and processing, critical analysis and information synthesis; method of a systematic approach to solving the tasks.	
7. To be able to process and analyze source information	Lections; Seminars; Independent work
8. Know the basic concepts of databases (database) and database management systems (DBMS)	Lections; Seminars; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 5				
Didactic unit: Basic methods and approaches INNA				
1. Basic concepts of applied system analysis.		6	6	Lecture.
Didactic unit: System Analysis Methodology				
2. Setting private problem problems.		6	5, 8	Lecture.
Didactic unit: System analysis toolkit				
3. Static properties of systems. Integrity, openness, structure.		10	1, 3, 4, 7, 8	Practice .
Didactic unit: The main concepts of decision making theory				
4. Dynamic properties of systems. Functionality, stimulus, variability in time.		4	1, 2, 4	Lecture.
Didactic unit: Models and methods of solutions selection theory				
5. Properties of technical systems. Static static systems. Stability of dynamic systems.		2	1, 2, 4	Lecture.
6. Models and methods for selecting solutions in conditions of criterion uncertainty		2	1, 2, 4	Lecture.
7. Decision making in conditions of statistical uncertainty		2	1, 2, 4	Lecture.
8. Decision making in conflict uncertainty		2	1, 2, 4	Lecture.
9. Measuring experiment, processing measurement results.		2	1, 2, 4, 6	Lecture.

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 5				
Didactic unit: System analysis toolkit				
1. System analysis tools	4	4	1, 2, 3, 4, 5, 6, 8	Practice .

Didactic unit: Models and methods of solutions selection theory				
2. Models and methods for solving problems of decision-making theory in terms of definiteness	6	8	1, 2, 7	Practice .
3. Phenomenon of electromagnetic induction Vortex electric field. The law of electromagnetic induction of Faraday. Lenza rule.	8	6	1, 2, 5, 7	Practice .

Table 3.3

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 5				
Didactic unit: Basic methods and approaches INNA				
1. Basic concepts and history of development of system studies		5	1, 2, 3, 4, 5, 6, 8	Independent study of theoretical material
Didactic unit: System analysis toolkit				
3. System analysis tools		6	3, 5, 8	Systems for controlling power electronic devices. Appointment and basic principles of operation. Basic Principles of Impulse Systems. Management of bipolar and field transistor. Thyristor control. Electronic control systems. Elemental base of the control system.

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Methodological support

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Specialized software

1 Calculator of the cost and timing of the project and its stages according to the COCOMO COCOMO® II.2000.4 methodology

2 Microsoft Office Application Pack

ANNOTATION OF THE PROGRAM
Computing system architecture

Course: 3, semester : 6

		Semester
№	**Kind of activity**	**6**
1	Total credits	4
2	Total hours	144
3	Total classes in the contact form, hours	63
4	Lectures, hours	18
5	Practical lessons, hours	0
6	Laboratory studies, hours	36
7	of them in an active and interactive form, hours	16
8	Consultations, hours	7
9	Independent work, hours	81

External requirements

The ability to conduct research at all stages of the software product life cycle; ***regarding the following learning results*****:**
to know about the features of the project planning in accordance with the task received
is able to determine the range of tasks in the framework of the target and choose the best ways to solve them, based on existing legal norms, resources available and restrictions; ***regarding the following learning results*****:**
to be able to: conduct an analysis of the goal and formulate the tasks that need to be solved to achieve it; analyze alternative options to achieve the outlined results; Use regulatory documentation in the field of professional activity.

Requirements for the results of mastering the discipline

The results of the study of the discipline	**Forms of organizing classes**
to know about the features of the project planning in accordance with the task received	
1. Principles of organization of interrupt systems in modern computers.	Lections; Laboratory works; Independent work
2. Model structure and operation of the computer's central processor.	Lections; Laboratory works; Independent work
3. the main algorithms of computer arithmetic.	Lections; Laboratory works; Independent work
4. 1. To be able to complete the project in accordance with the assignment received.	Lections; Laboratory works; Independent work
5. Methods for the development and management of projects	Lections; Laboratory works; Independent work

6. organization principles In computers input / output systems	Lections; Laboratory works; Independent work
7. Clearly formulate a list of basic technical data to design	Lections; Laboratory works; Independent work
8. the hierarchy of the memory of modern computers.	Lections; Laboratory works; Independent work
9. the main architectures of modern computers.	Lections; Laboratory works; Independent work
to be able to: conduct an analysis of the goal and formulate the tasks that need to be solved to achieve it; analyze alternative options to achieve the outlined results; Use regulatory documentation in the field of professional activity.	
10. Types of peripheral devices used in modern computers.	Lections; Laboratory works; Independent work
11. effectively Compose RAM on storage elements (memory modules).	Lections; Laboratory works; Independent work
12. Competently choose the type of computer for specific practical use.	Lections; Laboratory works; Independent work
to know about the features of the project planning in accordance with the task received	
13. Welcome uncomplicated programs on a machine-oriented assembler language.	Lections; Laboratory works; Independent work
to be able to: conduct an analysis of the goal and formulate the tasks that need to be solved to achieve it; analyze alternative options to achieve the outlined results; Use regulatory documentation in the field of professional activity.	
14. about transformation The stream energy into the mechanical energy of rotation of the rotor in the step.	Lections; Laboratory works; Independent work
15. to competently select the composition of peripheral devices in specific conditions.	Lections; Laboratory works; Independent work
to know about the features of the project planning in accordance with the task received	
16. Develop interactive graphic pre- and postprocessors to solve the problems of numerical modeling	Lections; Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 6				
Didactic unit: History Development of computer equipment.				
1. 1. Brief history of the development of computer equipment and the performance of computers.		1	1, 10, 12, 13, 14, 16, 2, 5, 7	Lecture.
1. 2. A generalized structural scheme of computers and their classification.		1	1, 13, 15, 2, 5, 8, 9	Lecture.
Didactic unit: Characteristics of photoelectric information transducers (FPI)				
2. 2. Presentation in computers of symbolic information and sound information.		1	13, 2, 3, 6, 7	Lecture.
2. 3. Representation in computers of visual information and numeric information.		1	10, 13, 16, 2, 6, 7	Lecture.
Didactic unit: Basics of computer arithmetic.				

3. 1.1. Display sets. 1.2. Number sequence. The limit of the numeric sequence and its properties. 1.3. The function of one variable. Limit function at point. Infinitely large and infinitely small functions. Limit function in infinity. One-sided limits. Properties of limits. The first and second wonderful limits. 1.4. Continuity function. Continuity of the main elementary functions. Properties of functions are continuous at the point and on the segment. Gap points and their classification.		1	13, 16, 3	Lecture.
3. 2. Operations with real numbers.		1	13, 16, 3, 6, 9	Lecture.
Didactic unit: Electronic transforming devices of electrical signals				
4. 2.1. Linear operations over vectors and their properties. 2.2. Scalar, vector and mixed vectors. 2.3. Baseline decomposition.		1	11, 16, 4, 9	Lecture.
4. 1. Combination elements and nodes.		1	10, 13, 4, 5, 6	Lecture.
Didactic unit: Organization of memory of computers.				
5. 2. Architecture of modern system boards.		1	10, 11, 13, 8, 9	Lecture.
5. 3. ROM BIOS system module.		1	13, 14, 5, 6, 8	Lecture.
5. 1. Classification and main characteristics of computer storage devices.		1	11, 13, 4, 8	Lecture.
Didactic unit: Theory of probability calculus				
6. 2. Functioning CPU.		1	16, 2, 6	Lecture.
6. 1. Register organization CPU.		1	16, 2, 6	Lecture.
Didactic unit: Organization of computer interrupt systems.				
7. 1. Types of interrupt requests in computers. Interrupt systems of modern computers.		1	1, 16, 5	Lecture.
Didactic unit: Organizational part of the project management				
8. Typical I / O devices in computers.		1	10, 14, 16, 6	Lecture.
8. Features of the organization of I / O organization.		1	14, 15, 16, 6	Lecture.
Didactic unit: Typical constructive personal computers.				

9. 1.1. Fuel, hydraulic and nuclear energy resources and their characteristics. 1.2. Principles of device and characteristics of thermal, hydraulic and atomic electrical stations. 1.3. Electrical networks and substations, concepts and characteristics of electric power systems.		1	10, 11, 12, 14, 15, 16, 5, 8, 9	Lecture.
9. 1. Constructive ATX PC		1	12, 14, 15, 16, 8, 9	Lecture.

Table 3.2

Themes	**Active forms, hours**	**Hours**	**Links to learning results**	**Learning activities**
Semester: 6				
Didactic unit: History Development of computer equipment.				
1. Acquaintance with the AFDPRO debugger work and study of information presentation forms in computers.	4	8	12, 13, 14, 15, 16, 2, 4, 5, 7, 9	Laboratory work. Initialize the AFDPRO full-screen debugger on the personal computer, and read the main debugger directives necessary for its management. Enter the program in the assembly language simulated computer in the RAM and the data array proposed by the teacher. Using the debugger directives to find in the program specified by the team teacher, as well as the specified data. Initiate the specified program and monitor the processor running in step by step and continuous mode.
Didactic unit: Theory of probability calculus				
2. Studying the organization and operation of the CPU of the basic processor of the IX86 family.	4	8	1, 10, 11, 12, 13, 14, 15, 16, 2, 3, 5, 8, 9	Laboratory work. Initialize the work of the debugger on the personal computer. Enter the program and an array of data obtained from the teacher to the RAM to the simulated computer. Determine the location in the RAM area stack, and display the contents of the first 80 free stack memory cells on the display screen in the form of one of the dumps. To monitor the correctness of the formats of commands and their compliance with assembler expressions, for several commands specified by the teacher.
Didactic unit: Organizational part of the project management				

3. Studying the organization of the interruption of computers, as well as obtaining the skills for obtaining a trace trace and macro creation skills when debugging programs .	4	8	1, 11, 12, 13, 14, 15, 16, 7, 8, 9	Laboratory work. Initialize the work of the AFDPRO debugger on the personal computer. Enter the program and the data array obtained from the teacher in the RAM to the simulated computer. ADD 4 - 5 control points in the program at various processor reactions to achieve them. Check the ability to dial the program or divide to zero and eliminate these features. Initiate the program execution by all possible ways and, in each case, get a trace trace of its execution in three possible options. Create a macro from directives: a) download the file of the program being debugged into RAM to the simulated computers from the external memory; b) enter files of the specified checkpoints; c) running the program for execution; d) Getting a full trace trace execution of the program fragment. Check the work of the created macro.
4. Studying an organization in computers input / output systems and receiving programming skills in the assembler language.	4	12	10, 12, 13, 14, 15, 16, 3, 6, 7, 9	Laboratory work. Develop a program for solving the task asked by the teacher in the assembler language. Initialize the work of the AFDPRO debugger. Enter the developed program in the RAM of the simulated computer. Delerate the entered program. To present the listing of the well-defined program to the teacher, demonstrate its performance and explain the logic of its construction.

Literary sources

Main literature

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Internet resources

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Methodical support and software

Methodological support

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Specialized software

1 Calculator of the cost and timing of the project and its stages according to the COCOMO COCOMO® II.2000.4 methodology

2 Microsoft Office Application Pack

ANNOTATION OF THE PROGRAM
Computing Machines and Systems

Course: 3, semester : 6

		Semester
№	**Kind of activity**	**6**
1	Total credits	4
2	Total hours	144
3	Total classes in the contact form, hours	63
4	Lectures, hours	18
5	Practical lessons, hours	0
6	Laboratory studies, hours	36
7	of them in an active and interactive form, hours	16
8	Consultations, hours	7
9	Independent work, hours	81

External requirements

The ability to conduct research at all stages of the software product life cycle; ***regarding the following learning results*****:**
to know about the features of the project planning in accordance with the task received
is able to determine the range of tasks in the framework of the target and choose the best ways to solve them, based on existing legal norms, resources available and restrictions; ***regarding the following learning results*****:**
to be able to: conduct an analysis of the goal and formulate the tasks that need to be solved to achieve it; analyze alternative options to achieve the outlined results; Use regulatory documentation in the field of professional activity.

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes
to know about the features of the project planning in accordance with the task received	
1. Know the principles of constructing measuring instruments and systems with microprocessor control	Lections; Laboratory works; Independent work
2. have experience finding the necessary information on the Internet	Lections; Laboratory works; Independent work
to be able to: conduct an analysis of the goal and formulate the tasks that need to be solved to achieve it; analyze alternative options to achieve the outlined results; Use regulatory documentation in the field of professional activity.	
3. Basic principles of organization and architecture of computing machines, systems, networks	Lections; Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 6				
Didactic unit: Coordinate converters in vector control systems				
1. Principles and theoretical foundations of constructing modern computers. .		2	1, 2, 3	Lecture
2. Principles for the construction and operation of modern computers.	2	3	1, 2, 3	Lecture
3. Structures of personal computers.	2	3	1, 2, 3	Lecture
6. Managing computing complexes, systems and networks	2	3	1, 2, 3	Lecture
7. Memory of computing machines.		2	3	Lecture
Didactic unit: Peripheral devices				
4. Peripheral devices of the computer and organization of I / O systems	2	2	1, 2, 3	Lecture
Didactic unit: Software				
5. Computer Software.	2	3	1, 2, 3	Lecture

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 6				
Didactic unit: Coordinate converters in vector control systems				
1. Basic principles of PCs	2	9	1, 2, 3	Laboratory work number 1
2. Processing complex tasks	2	9	3	Laboratory work number 2
Didactic unit: Peripheral devices				
4. Computing networks		9	1, 2, 3	Laboratory work №4
Didactic unit: Software				
3. Debugging applications	2	9	2	Laboratory work number 3

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Main literature

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Methodical support and software

Methodological support

1. Хабаров, С. П. Вычислительные машины, системы и сети / С. П. Хабаров, М. Л. Шилкина. — Санкт-Петербург : СПбГЛТУ, 2017. — 240 с. — ISBN 978-5-9239-0888-6. — Текст : электронный // Лань : электронно-библиотечная система. — URL: https://e.lanbook.com/book/94728 (дата обращения: 14.03.2021). — Режим доступа: для авториз. пользователей.

2. Вычислительные машины, системы и сети. Ч. 2 : методические указания к лабораторным работам и практическим занятиям для 3 и 4 курсов АВТФ, направление 220200 (550200) "Автоматизация и управление" / Новосиб. гос. техн. ун-т ; [сост.: Е. В. Прохоренко и др.]. - Новосибирск, 2010. - 42, [1] с. : ил., табл.. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000123278

Specialized software

1 Operating System Microsoft Windows

ANNOTATION OF THE PROGRAM

Internet technologies

Course: 3, semester : 6

		Semester
№	**Kind of activity**	**6**
1	Total credits	4
2	Total hours	144
3	Total classes in the contact form, hours	47
4	Lectures, hours	18
5	Practical lessons, hours	0
6	Laboratory studies, hours	18
7	of them in an active and interactive form, hours	16
8	Consultations, hours	9
9	Independent work, hours	97

External requirements

The ability to conduct research at all stages of the software product life cycle; ***regarding the following learning results*:**
have the completion skills in accordance with the task received
is able to determine the range of tasks in the framework of the target and choose the best ways to solve them, based on existing legal norms, resources available and restrictions; ***regarding the following learning results*:**
to know: types of resources and restrictions for solving professional tasks; Basic methods for evaluating different ways to solve problems; Existing legislation and legal norms regulating professional activities.

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes
have the completion skills in accordance with the task received	
1. To be able to apply information technology when designing information systems	Lections; Laboratory works; Independent work
to know: types of resources and restrictions for solving professional tasks; Basic methods for evaluating different ways to solve problems; Existing legislation and legal norms regulating professional activities.	
2. Know information resources of networks	Lections; Laboratory works; Independent work
3. Know the hierarchy of models of processes in networks, information exchange management technology in networks	Lections; Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 6				
Didactic unit: Global computer network Internet				
1. TCP / IP protocol. Seven-level OSI architecture. Architecture and principles of information transfer on the Internet.	4	4	1, 2, 3	Lecture.
8. Databases as an information resource. Network technologies as a global information resource.		2	1, 2, 3	Lecture.
Didactic unit: Internet addressing system				
2. Structure of a universal URL resource pointer. IP addresses. Domain system names. Connect to the Internet.	2	2	1, 2, 3	Lecture.
7. Basic IP network classes.		2	1, 2, 3	Lecture.
Didactic unit: Communication of the chemical composition of materials with their properties, dependence of properties from external conditions.				
3. Architecture "Client Server". Email E-mail and Web Mail. Service service FTP files.	4	4	1, 2, 3	Lecture.
5. Technology for building interactive user interfaces AJAX.		2	1, 2, 3	Lecture.
Didactic unit: Marketing Promotion of the Web-site				
4. Principles indexing Web pages by search engines. Turning on metiaformation In the Web page. The structure of Web catalogs. Organization of the advertising company Web node.	2	2	1, 2, 3	Lecture.

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 6				
Didactic unit: Global computer network Internet				
1. Installing WEB technology development tools and design of a static website (HTML).		3	1, 2, 3	Laboratory work.
Didactic unit: Communication of the chemical composition of materials with their properties, dependence of properties from external conditions.				

2. Creating dynamic web pages based on XML, XSL languages. Using the XMLPAD editor. Enable web applications based on one of ASP, PHP, JSP, PERL.	2	3	2	Laboratory work.
Didactic unit: Modern Specialized Software Mathematical Provision for Solving Task Tasks, Processing and Transferring Information and Information Research in the field of infocommunications and electronics.				
3. Organization of data exchange between applications.		3	1	Laboratory work.
Didactic unit: Style design of Web pages (Cascading style sheets CSS)				
4. Technological features of web design. Graphic effects.	2	3	2, 3	Laboratory work.
Didactic unit: Creating a Web - Forms, sending user data to email address via email client, save data on server (RNR or ASP technology).				
5. Organization of the interaction of scripts with DBMS.		3	1, 3	Laboratory work.
6. Development of interactive web pages using the jQuery library.		3	1, 2	Laboratory work.

Literary sources

Main literature

1. Хворостов В. А. Объектно-ориентированное программирование на php 5 [Электронный ресурс] : конспект лекций / В. А. Хворостов ; Новосиб. гос. техн. ун-т. - Новосибирск, [2013]. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000180055. - Загл. с экрана.

2. Lengstorf J. PHP for Absolute Beginners [electronic resource] / / by Jason Lengstorf. - Berkeley, CA :, 2010. : v.: digital // Springer eBooks. - Режим доступа: http://dx.doi.org/10.1007/978-1-4302-2474-7

3. ИнформатикА [Электронный ресурс] / ООО " Чистые пруды". - Москва, 2014 -. - 1 электрон. опт. диск (CD-ROM). - Режим доступа: http://информатика.1сентября.рф/

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5. http://znanium.com/

Methodical support and software

Methodological support

1. Новицкая Ю. В. Учебно-методический комплекс по дисциплине «Интернет и персональный компьютер» [Электронный ресурс] : [электронный учебно-методический комплекс] / Ю. В. Новицкая ; Новосиб. гос. техн. ун-т. - Новосибирск, [2008]. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000164244. - Загл. с экрана.

2. Петров Р. В. Современные технологии разработки веб-приложений: методические указания [Электронный ресурс] : учебно-методическое пособие / Р. В. Петров ; Новосиб. гос. техн. ун-т. - Новосибирск, [2011]. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000162345. - Загл. с экрана.

Specialized software

1 Mysql Mysql database management system

2 Content Management System (CMF), Web Application Development System WordPress Wordpress

ANNOTATION OF THE PROGRAM

Internet programming

Course: 3, semester : 6

		Semester
№	**Kind of activity**	**6**
1	Total credits	4
2	Total hours	144
3	Total classes in the contact form, hours	47
4	Lectures, hours	18
5	Practical lessons, hours	0
6	Laboratory studies, hours	18
7	of them in an active and interactive form, hours	16
8	Consultations, hours	9
9	Independent work, hours	97

External requirements

The ability to conduct research at all stages of the software product life cycle; ***regarding the following learning results*****:**
have the completion skills in accordance with the task received
is able to determine the range of tasks in the framework of the target and choose the best ways to solve them, based on existing legal norms, resources available and restrictions; ***regarding the following learning results*****:**
to know: types of resources and restrictions for solving professional tasks; Basic methods for evaluating different ways to solve problems; Existing legislation and legal norms regulating professional activities.

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes
have the completion skills in accordance with the task received	
1. To be able to apply information technology when designing information systems	Lections; Laboratory works; Independent work
to know: types of resources and restrictions for solving professional tasks; Basic methods for evaluating different ways to solve problems; Existing legislation and legal norms regulating professional activities.	
2. Know information resources of networks	Lections; Laboratory works; Independent work
3. Know the hierarchy of models of processes in networks, information exchange management technology in networks	Lections; Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 6				
Didactic unit:				
1. TCP / IP protocol. Seven-level OSI architecture. Architecture and principles of information transfer on the Internet.	4	4	1, 2, 3	Lecture.
8. Databases as an information resource. Network technologies as a global information resource.		2	1, 2, 3	Lecture.
2. Structure of a universal URL resource pointer. IP addresses. Domain system names. Connect to the Internet.	2	2	1, 2, 3	Lecture.
7. Basic IP network classes.		2	1, 2, 3	Lecture.
3. Architecture "Client Server". Email E-mail and Web Mail. Service service FTP files.	4	4	1, 2, 3	Lecture.
5. Technology for building interactive user interfaces AJAX.		2	1, 2, 3	Lecture.
4. Principles indexing Web pages by search engines. Turning on metiaformation In the Web page. The structure of Web catalogs. Organization of the advertising company Web node.	2	2	1, 2, 3	Lecture.

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 6				
Didactic unit:				
1. Installing WEB technology development tools and design of a static website (HTML).		3	1, 2, 3	Laboratory work.
2. Creating dynamic web pages based on XML, XSL languages. Using the XMLPAD editor. Enable web applications based on one of ASP, PHP, JSP, PERL.	2	3	2	Laboratory work.
3. Organization of data exchange between applications.		3	1	Laboratory work.
4. Technological features of web design. Graphic effects.	2	3	2, 3	Laboratory work.

5. Organization of the interaction of scripts with DBMS.		3	1, 3	Laboratory work.
6. Development of interactive web pages using the jQuery library.		3	1, 2	Laboratory work.

Literary sources

Main literature

1. Хворостов В. А. Объектно-ориентированное программирование на php 5 [Электронный ресурс] : конспект лекций / В. А. Хворостов ; Новосиб. гос. техн. ун-т. - Новосибирск, [2013]. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000180055. - Загл. с экрана.

2. Lengstorf J. PHP for Absolute Beginners [electronic resource] / / by Jason Lengstorf. - Berkeley, CA :, 2010. : v.: digital // Springer eBooks. - Режим доступа: http://dx.doi.org/10.1007/978-1-4302-2474-7

3. ИнформатикА [Электронный ресурс] / ООО " Чистые пруды". - Москва, 2014 -. - 1 электрон. опт. диск (CD-ROM). - Режим доступа: http://информатика.1сентября.рф/

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1. http://elibrary.nstu.ru/

2. https://e.lanbook.com/

3. http://www.iprbookshop.ru/

4. Роганов Е. Практическая информатика [Электронный ресурс] : курс / Е. Роганов // Интуит. Национальный открытый университет. - Режим доступа: http://www.intuit.ru/studies/courses/103/103/info. - Загл. с экрана.

5. http://znanium.com/

Methodical support and software

Methodological support

1. Новицкая Ю. В. Учебно-методический комплекс по дисциплине «Интернет и персональный компьютер» [Электронный ресурс] : [электронный учебно-методический комплекс] / Ю. В. Новицкая ; Новосиб. гос. техн. ун-т. - Новосибирск, [2008]. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000164244. - Загл. с экрана.

2. Петров Р. В. Современные технологии разработки веб-приложений: методические указания [Электронный ресурс] : учебно-методическое пособие / Р. В. Петров ; Новосиб. гос. техн. ун-т. - Новосибирск, [2011]. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000162345. - Загл. с экрана.

Specialized software

1 Mysql Mysql database management system

2 Content Management System (CMF), Web Application Development System WordPress Wordpress

ANNOTATION OF THE PROGRAM
Information networks

Course: 3, semester : 5

		Semester
№	**Kind of activity**	**5**
1	Total credits	4
2	Total hours	144
3	Total classes in the contact form, hours	94
4	Lectures, hours	36
5	Practical lessons, hours	0
6	Laboratory studies, hours	36
7	of them in an active and interactive form, hours	8
8	Consultations, hours	20
9	Independent work, hours	50

External requirements

The ability to conduct research at all stages of the software product life cycle; ***regarding the following learning results*****:**
have the completion skills in accordance with the task received
to know about the features of the project planning in accordance with the task received
is able to search, critical analysis and synthesis of information, apply a systematic approach to solving the set Tasks; ***regarding the following learning results*****:**
To be able to: apply search, collection and information processing techniques; Creit analysis and synthesis of information obtained from different sources; Apply the system approach to solve the tasks set.

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes
have the completion skills in accordance with the task received	
1. Know on the basic principles of the organization of information networks	Lections; Laboratory works; Independent work
2. To be able to both Spend the security of data	Lections; Laboratory works; Independent work
3. To be able to develop data processing programs based on solving feedbacks with explicit and implicit representation of the dependence of the measured data from the parameters of the medium	Lections; Laboratory works; Independent work
to know about the features of the project planning in accordance with the task received	
4. Know the main topology of networks and data transfer methods	Lections; Laboratory works; Independent work

5. Know the main tasks and principles of signal encoding in networks	Lections; Laboratory works; Independent work
6. Know the basic structures of global networks	Lections; Laboratory works; Independent work
To be able to: apply search, collection and information processing techniques; Creit analysis and synthesis of information obtained from different sources; Apply the system approach to solve the tasks set.	
7. to know the concept of transaction, blocking and controlling the locks in databases	Lections; Laboratory works; Independent work
8. to know about the basic principles of remote access	Lections; Laboratory works; Independent work
9. to know about the principles of switching packets in global networks	Lections; Laboratory works; Independent work
10. To be able to use network software	Lections; Laboratory works; Independent work
11. Know about the analog and digital electronic devices, about their advantages and disadvantages, about the conditions of applicability of those or others, have an idea of ??the nomenclature of the microcircuit produced.	Lections; Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 5				
Didactic unit: Basic concepts of information networks;				
1. The basic concepts of information networks. Evolution of information networks. Tasks of information networks, current trends, global and local networks. Requirements for information networks. Information resources of networks.		4	1	Lecture.
Didactic unit: class of information networks as open information systems; Models and structures of information networks; information resources networks; Theoretical foundations of modern information networks; Basic reference model of the international standards organization;				
2. UART, SPI, I2C interfaces.		2	1, 7	Lecture.
Didactic unit: Communication subnets; monocanal subnets; cyclic subnets; Nodal subnets;				
3. Models and information network structures: peer-to-peer networks, server networks, hybrid networks. Topology of information networks, addressing methods. Logical and physical structuring of networks.		4	1, 4, 9	Lecture.
Didactic unit: Methods of switching information; components of information networks; Network software and technical means of information networks.				

<table>
<tr><td>4. Components of information networks. Communication lines. Characteristics of communication lines. Cable standards. Data transfer methods. Digital coding. Logical coding. Data transfer methods. Synchronous and asynchronous transmission. Detection and correction of errors. Methods of switching information. Frequency multiplexing, division in time. Package switching. Concentrators, network adapters, bridges, switches.</td><td></td><td>8</td><td>1, 10, 2, 3, 5, 7, 9</td><td>Interactive survey at the end of the lecture on the material passed.</td></tr>
<tr><td colspan="5">Didactic unit: Production enterprise activities</td></tr>
<tr><td>5. Network solutions protocols. Multichannel, communication, cyclic subnets. Protocol implementations. Lower level protocol. General characteristics of protocols. Structure of Stan Darth IEEE 802.x. Level LLC (802.2) protocol. Ethernet technology, Token Ring, FDDI. Top-level protocols: TCR / IP, IPX / SPX, NetBIOS.</td><td></td><td>10</td><td>1, 2, 3, 4</td><td>Lecture.</td></tr>
<tr><td colspan="5">Didactic unit: Components of information networks; basic functional profiles; Full functional profiles;</td></tr>
<tr><td>6. Building local networks according to the standards of physical and channel levels. Technical implementation and additional functions of switches. Features of the technical implementation of switches. Characteristics affecting the performance of switches. Virtual local networks. Basic and complete functional profiles.</td><td></td><td>2</td><td>1, 11, 3, 7, 8, 9</td><td>Lecture.</td></tr>
<tr><td colspan="5">Didactic unit: System modeling</td></tr>
<tr><td>7. Principles of networking based on a network level protocols. Concept of internetworking. Methods for routing information flows. Router functions. Implementing the Fireless Interaction with TCP / IP. Addressing in IP networks. IP protocol. The structure of the IP package. Routing proteocides in IP networks. The main characteristics of routers and hubs. Erasing the faces between switches and routers.</td><td></td><td>4</td><td>1, 3, 7, 9</td><td>Lecture.</td></tr>
<tr><td colspan="5">Didactic unit: Internet service services</td></tr>
</table>

8. Global networks. DTE-DCE interfaces. Types of global networks. Global bonds based on void lines. Digital dedicated lines. Channel layer protocols for highlighted lines. Global ties based on Ka-Nalov Switching Networks. ISDN - networks with integral services. Connecting user equipment to the ISDN network. Principle of packet switching using virtual Ka-Nalov technology. Network X.25. Frame Relay networks.		2	1, 11, 2, 3, 4, 6, 9	Lecture.

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 5				
Didactic unit: Communication subnets; monocanal subnets; cyclic subnets; Nodal subnets;				
1. Setting the network adapter board. Working with a network running Windows XP.	1	2	1, 10, 2, 3, 4	Laboratory work. Studying the structure of the network adapter and requirements for the level of fire interfaces.
Didactic unit: Methods of switching information; components of information networks; Network software and technical means of information networks.				
2. Modeling digital encoding methods in IP.		8	1, 10, 5	Laboratory work. Development of software encoding software model. Writing a program. Comparison of signal parameters encoded by various coding methods.
3. Addressing in local Ethernet - networks. Set up a peer-to-peer network.		4	1, 11, 3, 8, 9	Laboratory work. Studying the principles of addressing information networks and the structure of local protocols in Windows. Configuring a peer-to-peer network.
Didactic unit: Components of information networks; basic functional profiles; Full functional profiles;				
4. Users and security groups. Sharing directories and printer.	1	4	1, 3, 4, 5	Laboratory work. Studying individual and group policies while ensuring the security of the information network in general access mode.
5. Addressing in IP networks. Administration in networks.	2	6	1, 4, 6, 7, 9	Laboratory work. Study of the principles of IP addressing, using masks. Setting the TCP / IP protocol settings on the local network. Checking the passage of persons, their audit.
Didactic unit: System modeling				

7. Ventative models of vehicles.	2	8	1, 4, 5, 6, 7, 9	Laboratory work.
Didactic unit: Internet service services				
6. Development of the structure of the information local network for an individual task.	2	4	1, 10, 11, 2, 7, 9	Laboratory work.

Literary sources

Main literature

1. Забуга А. А. Теоретические основы информатики : учебное пособие / А. А. Забуга ; Новосиб. гос. техн. ун-т. - Новосибирск, 2013. - 166, [1] с. : ил., табл.. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000183874

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Internet resources

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Methodical support and software

Methodological support

1. Колкер А. Б. Технологии сетевых коммуникаций : учебно-методическое пособие / А. Б. Колкер ; Новосиб. гос. техн. ун-т. - Новосибирск, 2016. - 90, [1] с. : табл.. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000229210

2. Артюшенко В. В. Компьютерные сети и телекоммуникации : учебно-методическое пособие / В. В. Артюшенко, А. В. Никулин ; Новосиб. гос. техн. ун-т. - Новосибирск, 2020. - 69, [2] с. : ил., табл.. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000242401

3. Прохоренко Е. В. Сети передачи данных : учебное пособие / Е. В. Прохоренко, А. Б. Колкер ; Новосиб. гос. техн. ун-т. - Новосибирск, 2008. - 182 с. : ил., табл.. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000114815. - Инновационная образовательная программа НГТУ «Высокие технологии».

Specialized software

1 Web server (HTTP server) Apache fraction group Apache 2.0.55

2 Operating System Microsoft Windows

3 Microsoft Visual Studio 2010

4 Software Package Virtualization Connectix / Microsoft Virtual PC for Mac

5 Web Server Apache

ANNOTATION OF THE PROGRAM

Network technologies

Course: 3, semester : 5

		Semester
№	**Kind of activity**	**5**
1	Total credits	4
2	Total hours	144
3	Total classes in the contact form, hours	94
4	Lectures, hours	36
5	Practical lessons, hours	0
6	Laboratory studies, hours	36
7	of them in an active and interactive form, hours	8
8	Consultations, hours	20
9	Independent work, hours	50

External requirements

The ability to conduct research at all stages of the software product life cycle; ***regarding the following learning results*****:**
have the completion skills in accordance with the task received
to know about the features of the project planning in accordance with the task received
is able to search, critical analysis and synthesis of information, apply a systematic approach to solving the set Tasks; ***regarding the following learning results*****:**
To be able to: apply search, collection and information processing techniques; Creit analysis and synthesis of information obtained from different sources; Apply the system approach to solve the tasks set.

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes
have the completion skills in accordance with the task received	
1. Know on the basic principles of the organization of information networks	Lections; Laboratory works; Independent work
2. To be able to both Spend the security of data	Lections; Laboratory works; Independent work
3. To be able to develop data processing programs based on solving feedbacks with explicit and implicit representation of the dependence of the measured data from the parameters of the medium	Lections; Laboratory works; Independent work
to know about the features of the project planning in accordance with the task received	
4. Know the main topology of networks and data transfer methods	Lections; Laboratory works; Independent work

5. Know the main tasks and principles of signal encoding in networks	Lections; Laboratory works; Independent work
6. Know the basic structures of global networks	Lections; Laboratory works; Independent work
To be able to: apply search, collection and information processing techniques; Creit analysis and synthesis of information obtained from different sources; Apply the system approach to solve the tasks set.	
7. to know the concept of transaction, blocking and controlling the locks in databases	Lections; Laboratory works; Independent work
8. to know about the basic principles of remote access	Lections; Laboratory works; Independent work
9. to know about the principles of switching packets in global networks	Lections; Laboratory works; Independent work
10. To be able to use network software	Lections; Laboratory works; Independent work
11. Know about the analog and digital electronic devices, about their advantages and disadvantages, about the conditions of applicability of those or others, have an idea of ??the nomenclature of the microcircuit produced.	Lections; Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 5				
Didactic unit: Basic concepts of information networks;				
1. The basic concepts of information networks. Evolution of information networks. Tasks of information networks, current trends, global and local networks. Requirements for information networks. Information resources of networks.		4	1	Lecture.
Didactic unit: class of information networks as open information systems; Models and structures of information networks; information resources networks; Theoretical foundations of modern information networks; Basic reference model of the international standards organization;				
2. UART, SPI, I2C interfaces.		2	1, 7	Lecture.
Didactic unit: Communication subnets; monocanal subnets; cyclic subnets; Nodal subnets;				
3. Models and information network structures: peer-to-peer networks, server networks, hybrid networks. Topology of information networks, addressing methods. Logical and physical structuring of networks.		4	1, 4, 9	Lecture.
Didactic unit: Methods of switching information; components of information networks; Network software and technical means of information networks.				

4. Components of information networks. Communication lines. Characteristics of communication lines. Cable standards. Data transfer methods. Digital coding. Logical coding. Data transfer methods. Synchronous and asynchronous transmission. Detection and correction of errors. Methods of switching information. Frequency multiplexing, division in time. Package switching. Concentrators, network adapters, bridges, switches.		8	1, 10, 2, 3, 5, 7, 9	Interactive survey at the end of the lecture on the material passed.
Didactic unit: Production enterprise activities				
5. Network solutions protocols. Multichannel, communication, cyclic subnets. Protocol implementations. Lower level protocol. General characteristics of protocols. Structure of Stan Darth IEEE 802.x. Level LLC (802.2) protocol. Ethernet technology, Token Ring, FDDI. Top-level protocols: TCR / IP, IPX / SPX, NetBIOS.		10	1, 2, 3, 4	Lecture.
Didactic unit: Components of information networks; basic functional profiles; Full functional profiles;				
6. Building local networks according to the standards of physical and channel levels. Technical implementation and additional functions of switches. Features of the technical implementation of switches. Characteristics affecting the performance of switches. Virtual local networks. Basic and complete functional profiles.		2	1, 11, 3, 7, 8, 9	Lecture.
Didactic unit: System modeling				
7. Principles of networking based on a network level protocols. Concept of internetworking. Methods for routing information flows. Router functions. Implementing the Fireless Interaction with TCP / IP. Addressing in IP networks. IP protocol. The structure of the IP package. Routing proteocides in IP networks. The main characteristics of routers and hubs. Erasing the faces between switches and routers.		4	1, 3, 7, 9	Lecture.
Didactic unit: Internet service services				

8. Global networks. DTE-DCE interfaces. Types of global networks. Global bonds based on void lines. Digital dedicated lines. Channel layer protocols for highlighted lines. Global ties based on Ka-Nalov Switching Networks. ISDN - networks with integral services. Connecting user equipment to the ISDN network. Principle of packet switching using virtual Ka-Nalov technology. Network X.25. Frame Relay networks.		2	1, 11, 2, 3, 4, 6, 9	Lecture.

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 5				
Didactic unit: Communication subnets; monocanal subnets; cyclic subnets; Nodal subnets;				
1. Setting the network adapter board. Working with a network running Windows XP.	1	2	1, 10, 2, 3, 4	Laboratory work. Studying the structure of the network adapter and requirements for the level of fire interfaces.
Didactic unit: Methods of switching information; components of information networks; Network software and technical means of information networks.				
2. Modeling digital encoding methods in IP.		8	1, 10, 5	Laboratory work. Development of software encoding software model. Writing a program. Comparison of signal parameters encoded by various coding methods.
3. Addressing in local Ethernet - networks. Set up a peer-to-peer network.		4	1, 11, 3, 8, 9	Laboratory work. Studying the principles of addressing information networks and the structure of local protocols in Windows. Configuring a peer-to-peer network.
Didactic unit: Components of information networks; basic functional profiles; Full functional profiles;				
4. Users and security groups. Sharing directories and printer.	1	4	1, 3, 4, 5	Laboratory work. Studying individual and group policies while ensuring the security of the information network in general access mode.
5. Addressing in IP networks. Administration in networks.	2	6	1, 4, 6, 7, 9	Laboratory work. Study of the principles of IP addressing, using masks. Setting the TCP / IP protocol settings on the local network. Checking the passage of persons, their audit.
Didactic unit: System modeling				

7. Ventative models of vehicles.	2	8	1, 4, 5, 6, 7, 9	Laboratory work.
Didactic unit: Internet service services				
6. Development of the structure of the information local network for an individual task.	2	4	1, 10, 11, 2, 7, 9	Laboratory work.

Literary sources

Main literature

1. Забуга А. А. Теоретические основы информатики : учебное пособие / А. А. Забуга ; Новосиб. гос. техн. ун-т. - Новосибирск, 2013. - 166, [1] с. : ил., табл.. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000183874

2. Хайретдинов М. С. Сетевые информационные технологии [Электронный ресурс] : электронный учебно-методический комплекс / М. С. Хайретдинов ; Новосиб. гос. техн. ун-т. - Новосибирск, [2011]. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000156377. - Загл. с экрана.

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Methodical support and software

Methodological support

1. Колкер А. Б. Технологии сетевых коммуникаций : учебно-методическое пособие / А. Б. Колкер ; Новосиб. гос. техн. ун-т. - Новосибирск, 2016. - 90, [1] с. : табл.. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000229210

2. Артюшенко В. В. Компьютерные сети и телекоммуникации : учебно-методическое пособие / В. В. Артюшенко, А. В. Никулин ; Новосиб. гос. техн. ун-т. - Новосибирск, 2020. - 69, [2] с. : ил., табл.. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000242401

3. Прохоренко Е. В. Сети передачи данных : учебное пособие / Е. В. Прохоренко, А. Б. Колкер ; Новосиб. гос. техн. ун-т. - Новосибирск, 2008. - 182 с. : ил., табл.. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000114815. - Инновационная образовательная программа НГТУ «Высокие технологии».

Specialized software

1 Web server (HTTP server) Apache fraction group Apache 2.0.55
2 Operating System Microsoft Windows
3 Microsoft Visual Studio 2010
4 Software Package Virtualization Connectix / Microsoft Virtual PC for Mac
5 Web Server Apache

ANNOTATION OF THE PROGRAM
Thermodynamic Fundamentals of thermal Power Plant

Course: 3, semester : 6

		Semester
№	**Kind of activity**	**6**
1	Total credits	2
2	Total hours	72
3	Total classes in the contact form, hours	46
4	Lectures, hours	18
5	Practical lessons, hours	0
6	Laboratory studies, hours	18
7	of them in an active and interactive form, hours	18
8	Consultations, hours	8
9	Independent work, hours	26

External requirements

The ability to conduct research at all stages of the software product life cycle; ***regarding the following learning results*:**
have the completion skills in accordance with the task received
is able to search, critical analysis and synthesis of information, apply a systematic approach to solving the set Tasks; ***regarding the following learning results*:**
own: search methods, collection and processing, critical analysis and information synthesis; method of a systematic approach to solving the tasks.

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes
have the completion skills in accordance with the task received	
1. Know the basic means of mathematical you numbers	Lections; Laboratory works; Independent work
2. to know the use of secondary energy resources	Lections; Laboratory works; Independent work
own: search methods, collection and processing, critical analysis and information synthesis; method of a systematic approach to solving the tasks.	
3. To be able to use filters in order to improve or segmented images electrical energy quality parameters	Lections; Laboratory works; Independent work
4. Know the basic methods of image recognition, methods and algorithms of filtration, improvement and segmentation of images	Lections; Laboratory works; Independent work

5. To be able to analyze problems, analysis of goals using various tools	Lections; Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 6				
Didactic unit: Image				
1. Introduction to the course. Technical vision in modern information systems. Summing of technology, solutions, tasks. Image analysis task. An image as a digital signal, features of its analysis, receipt, storage.	2	4	1, 2	Lecture
2. Image compression. Popular modern image compression algorithms. Problems arising from image compression. Artifacts.		4	1, 2, 3, 4, 5	Lecture
3. Storage of data data. Multidimensional arrays. Data streams. Common image storage formats. Formats of storage of video streams.		2	1, 2	Study of image storage formats and Video streams.
4. Methods for obtaining streaming data of images and video signals from digital systems. Low level libraries. High level libraries. Tire FireWire IEEE1934. USB bus. Import data from Ethernet cameras. Work with RAW images.		2	1, 2, 4, 5	Study of project research methods, training for morphological cards
Didactic unit: Image of the image poles				
5. Hardware for registration of images and video signals. Types of matrices used when registering images. The main parameters and characteristics are actual to work with equipment (resolution, sensitivity, diaphragm, excerpt). Optical systems and their characteristics. Distortion made by optical systems. Noise and interference. Matrixes, types of matrices.		4	1, 2, 4, 5	Study of optical systems.
Didactic unit: Image processing				
6. Image filtering: convolutions, linear filters, nonlinear filters, data processing in the frequency domain (wavelet, Fourier), work with histograms and other related characteristics.		2	1, 2, 3, 4, 5	Study of image filtering methods.

Table 3.2

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 6				
Didactic unit: Image				
1. Image compression algorithms.	4	4	1, 2, 3, 4, 5	Study of the RLE, LZ algorithms, Huffman method.
Didactic unit: Image of the image poles				
2. OpenCV Hello World - Getting data from a USB camera. Working with V4L interface (Video4Linux).	6	6	1, 2, 3, 4, 5	Study of additional sources of literature when preparing for testing on discipline
Didactic unit: Image processing				
3. Image filtering: convolutions, linear filters, nonlinear filters, data processing in the frequency domain (wavelet, Fourier), work with histograms and other related characteristics.	6	8	1, 2, 3, 4, 5	Study of image filtering methods.

Literary sources

Main literature

1. Гужов В. И. Математические методы цифровой голографии : учебное пособие / В. И. Гужов ; Новосиб. гос. техн. ун-т. - Новосибирск, 2017. - 77, [2] с. : ил.. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000234844

2. Грузман И. С. Цифровая обработка изображений в информационных системах [Электронный ресурс] : цифровые методы обработки изображений : конспект лекций / Грузман И. С., Карпушин В. Б., Никитин С. В. ; Новосиб. гос. техн. ун-т. - Новосибирск, 2010. - 1 электрон. опт. диск (CD-ROM). - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000156286. - Загл. с этикетки диска.

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1. Шустова Л.И. Базы данных [Электронный ресурс] : учебник / Л.И. Шустова, О.В. Тараканов. - Москва : ИНФРА-М, 2017. - Режим доступа : http://www.dx.doi.org/10.12737/11549. - Загл. с экрана.

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Methodical support and software

Methodological support

1. Борисова И. В. Цифровые методы обработки информации : учебное пособие / И. В. Борисова ; Новосиб. гос. техн. ун-т. - Новосибирск, 2014. - 137, [1] с. : ил., табл.. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000200409

Specialized software

1 Open Source SOCTWARE Operating System Linux Software Operating Systems

ANNOTATION OF THE PROGRAM

Methods and means of designing information systems and technologies

Course: 2, semester : 4

		Semester
№	**Kind of activity**	**4**
1	Total credits	2
2	Total hours	72
3	Total classes in the contact form, hours	42
4	Lectures, hours	0
5	Practical lessons, hours	0
6	Laboratory studies, hours	36
7	of them in an active and interactive form, hours	8
8	Consultations, hours	4
9	Independent work, hours	30

External requirements

The ability to conduct research at all stages of the software product life cycle; ***regarding the following learning results*****:**
have the completion skills in accordance with the task received
is able to search, critical analysis and synthesis of information, apply a systematic approach to solving the set Tasks; ***regarding the following learning results*****:**
To be able to: apply search, collection and information processing techniques; Creit analysis and synthesis of information obtained from different sources; Apply the system approach to solve the tasks set.

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes
have the completion skills in accordance with the task received	
1. Be able to use the LabVIEW type application program when designing information systems	Laboratory works; Independent work
To be able to: apply search, collection and information processing techniques; Creit analysis and synthesis of information obtained from different sources; Apply the system approach to solve the tasks set.	
2. to know typical application packages used in designing devices, devices and systems	Laboratory works; Independent work
3. to know the rules of experimental research	Laboratory works; Independent work

4. to know the safety rules of information systems and technology	Laboratory works; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 4				
Didactic unit: Acquaintance with LabVIEW				
1. Introduction to LabView.		4	1, 2, 4	Laboratory work. Studying the interface of the LabVIEW design environment, receiving the skills of working with the front panel and a virtual instrument block diagram, acquaintance with editing tools and the palettes of functions and controls.
2. Modularity	1	4	1, 2, 3	laboratory work. Acquaintance with the concept of subprimation (subvi); Acquisition of connectors' creation skills (Connectors) and subprimor icons (Icon), using subprimors in virtual instruments.
Didactic unit: Data structures				
3. cycles	1	4	1, 2, 3	Laboratory work. Studying WHILE LOOP and FOR LOOP cycles, obtaining access skills to the data of previous iterations in cycles.
4. The use of secondary energy resources to obtain electrical and thermal energy	2	8	1, 2, 3, 4	Laboratory work. Studying the concept of arrays, basic functions for working with arrays, representations of arrays on the front panel. Acquaintance with the concept of clusters, obtaining skills to work with cluster functions.
5. Sequences	1	4	1, 2, 3	Laboratory work. Acquaintance with the concept of the structure of the sequence language, obtaining the skills of creating a sequence and work with its internal variables.
Didactic unit: Graphs				
6. Graphs	1	4	1, 2, 3	Laboratory work. Acquaintance with the species of charts Chart, Graph and Xy Graph, receiving data visualization skills on schedules.
Didactic unit: Lines				

7. Lines	1	4	1, 2, 3	Laboratory work. Study of a string type of data; Learning functions for working with rows.
Didactic unit: Files				
8. File input / output	1	4	1, 2, 3, 4	Laboratory work. Familiarity with the concept of files, mastering high-level functions to work with files.

Literary sources

Main literature

1. Блюм, П. LabVIEW: стиль программирования / П. Блюм ; под редакцией П. Михеева. — 2-е изд. — Саратов : Профобразование, 2019. — 400 с. — ISBN 978-5-4488-0104-4. — Текст : электронный // Электронно-библиотечная система IPR BOOKS : [сайт]. — URL: http://www.iprbookshop.ru/89869.html (дата обращения: 16.03.2021). — Режим доступа: для авторизир. пользователей

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Methodical support and software

Methodological support

1. Баран Е. Д. Измерения в LabVIEW : учебное пособие / Е. Д. Баран, Ю. В. Морозов ; Новосиб. гос. техн. ун-т. - Новосибирск, 2010. - 161 с. : ил., схемы. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000142341. - В вып. дан. авт.: Баран Ефим Давыдович (!).

Specialized software

1 Calculator of the cost and timing of the project and its stages according to the COCOMO COCOMO® II.2000.4 methodology

2 Wednesday graphic programming means of automating NI LabVIEW

3 Microsoft Office Application Pack

ANNOTATION OF THE PROGRAM
Project activities

Course: 3 4, semester ы : 5 6 7

		Semester		
№	**Kind of activity**	**5**	**6**	**7**
1	Total credits	2	2	2
2	Total hours	72	72	72
3	Total classes in the contact form, hours	39	39	39
4	Lectures, hours	0	0	0
5	Practical lessons, hours	36	36	36
6	Laboratory studies, hours	0	0	0
7	of them in an active and interactive form, hours	0	0	0
8	Consultations, hours	1	1	1
9	Independent work, hours	33	33	33

External requirements

The ability to carry out project activities at all stages of the project's life cycle; ***regarding the following learning results*****:**
to be able to determine the problem and how to solve it in the project
To be able to identify the necessary resources for the implementation of project tasks
to be able to organize and coordinate the work of the project participants

Requirements for the results of mastering the discipline

The results of the study of the discipline	Forms of organizing classes
to be able to determine the problem and how to solve it in the project	
1.	Seminars; Independent work
to be able to organize and coordinate the work of the project participants	
2. To be able to collect and process information, materials (able to choose the appropriate information and use it correctly)	Seminars; Independent work
To be able to identify the necessary resources for the implementation of project tasks	
3. To be able to draw up an algorithm for analyzing the situation, goaling, planning and evaluating the results of the project; Project Monitoring Techniques	Seminars; Independent work

Content and structure of the discipline

Table 3.1

Themes	Active forms, hours	Hours	Links to learning results	Learning activities
Semester: 5				
Didactic unit: concept of project activity				
1. Project approach. Introduction to project management.		6	1, 2, 3	Practice .
2. Content of project activities.		6	1, 2, 3	Practice .
3. Project as an object of management.		6	1, 2, 3	Practice .
4. Subjects Project management.		6	1, 2, 3	Practice .
5. Processes and project management functions.		6	1, 2, 3	Practice .
6. Initiation and Start Project.	1	6	1, 2, 3	Practice .
Semester: 6				
Didactic unit: Organizational planning of the project.				
1. Formation of the project's goals.		6	1, 2, 3	Practice .
2. Project planning.		6	1, 2, 3	Practice .
3. Manage the project schedule.		6	1, 2, 3	Practice .
4. Organizational planning and logistics project.		6	1, 2, 3	Practice .
5. organizational structure of the project.		6	1, 2, 3	Practice .
6.	1	6	1, 2, 3	Practice .
Semester: 7				
Didactic unit: design of the project product.				
1. Registration of the project product (in accordance with its form).		6	1, 2, 3	Practice .
2. Project risk management.		6	1, 2, 3	Practice .
3. Identification and processing of the risks of the project.		6	1, 2, 3	Practice .
4. Project control.		6	1, 2, 3	Practice .
5. Execution and completion of the project.		6	1, 2, 3	Practice .
6. Preparing for project protection / presentation of the project product.	2	6	1, 2, 3	Practice .

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2. HARB [Электронный ресурс] : интернет-проекты для IT-специалистов. - «TM», 2006 – 2018. - Режим доступа: http://government.ru/department/410/projects/. - Загл. с экрана.

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5. http://www.iprbookshop.ru/

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Methodical support and software

Methodological support

1. Морозов Ю. В. Проектная деятельность [Электронный ресурс] : учебно-методическое пособие / Ю. В. Морозов, А. А. Спектор ; Новосиб. гос. техн. ун-т. - Новосибирск, [2018]. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000239262. - Загл. с экрана.

2. Куликова Д. Н. Проектная деятельность [Электронный ресурс] : электронный учебно-методический комплекс / Д. Н. Куликова ; Новосиб. гос. техн. ун-т. - Новосибирск, [2019]. - Режим доступа: http://elibrary.nstu.ru/source?bib_id=vtls000239899. - Загл. с экрана.

Specialized software

Использование специализированного программного обеспечения для изучения дисциплины не требуется

АННОТАЦИЯ к рабочей программе дисциплины (модуля)
ФИЗИЧЕСКАЯ КУЛЬТУРА и СПОРТ

Общая трудоемкость дисциплины составляет 2 зачетные единицы, 400 часов.

Освоение студентами модуля «Физическая культура и спорт» включает изучение двух частей:

- Базовая часть модуля - «Физическая культура» - 2 семестра. Раздел обязателен для изучения, включает в себя теоретический, методико-практический и контрольный разделы программы. Итоговая аттестация - зачет, с получением 2-х зачетных единиц (не менее 72ч).
- Вариативная часть модуля - «Прикладная физическая культура» - 1-8 семестр. Раздел обязателен для изучения, включает в себя учебно-тренировочный и контрольный разделы программы. Итоговая аттестация - зачет (не менее 328 ч).

Учебный материал базовой части модуля – дисциплины «Физическая культура» – реализуется в рамках методико-практических занятий на следующих отделениях кафедры:

- лыжные гонки (для юношей);

- аэробика (для девушек).

Для изучения материала в вариативной части модуля студенту необходимо выбрать одно из следующих учебных отделений кафедры: атлетизм, аэробика, спортивные игры, единоборства, плавание, гимнастика, легкая атлетика.

Изучение модуля «Физическая культура и спорт» в рамках ВО (бакалавриат) направлено на формирование у студентов следующей основной общекультурной компетенции:

способность использовать методы и средства физической культуры для обеспечения полноценной социальной и профессиональной деятельности (ОК8)

В результате изучения модуля студент должен

Знать:

- основы здорового образа жизни;
- последствия отклонения от здорового образа жизни.

Уметь:

- поддерживать здоровый образ жизни.

Учебно-методическое и информационное обеспечение дисциплины.
Основная литература:

1. Педагогика физической культуры : учебник / [С. Д. Неверкович и др.] ; под ред. С. Д. Неверковича. – 3-е изд., стер. – М. : Академия , 2014. – 361, [1] с.
2. Казакова Т. Н. Теория и методика адаптивной физической культуры : учебное пособие / Т. Н. Казакова, Новосиб. гос. техн. ун-т. – Новосибирск : Изд-во НГТУ , 2015. – 24, [2] с.

3. Казакова Т. Н. Теория и методика адаптивной физической культуры [Электронный ресурс] : электрон.учебно-метод. комплекс / Т. Н. Казакова ; Новосиб. гос. техн. ун-т. – Новосибирск, 2014. – Режим доступа : http://dispace.edu.nstu.ru/didesk/course/show/4778. – Загл. с экрана
4. Кузнецов В. С. Теория и методика физической культуры : учебник / В. С. Кузнецов. – М. : Академия , 2012. – 409, [1] с. ил.

Периодические издания:

1. Физкультура культура и спорт [Текст] : науч.-метод. журн. / РА Образования РГУФКСМиТ; Вест. ПСФК РА Образования; Науч.-издат. центр "Теория и практика физической культуры и спорта". – Период.: 6 раз в год. – 80 с. – Изд. с 1996 г. – ISSN 1817-4779.
2. Теория и практика физической культуры [Текст] : ежемес. науч.-теорет. журн. – Период.: 12 раз в год. – ISSN 0040-3601

Программное обеспечение и Интернет-ресурсы:

1. Центральная отраслевая библиотека по физической культуре и спорту [Электронный ресурс] : портал. – Режим доступа : http://lib.sportedu.ru. – Загл. с экрана.
2. Научная электронная библиотека eLIBRARY.RU [Электронный ресурс] : портал. – Режим доступа : http://www.elibrary.ru. – Загл. с экрана.
3. Teoriya.ru. Журнал «Теория и практика физической культуры» [Электронный ресурс] : портал. – Режим доступа : http://teoriya.ru/ru. – Загл. с экрана.
4. Teoriya.ru. Журнал «Физическая культура: воспитание, образование, тренировка» [Электронный ресурс] : портал. – Режим доступа : http://teoriya.ru/ru. – Загл. с экрана.