



MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE RUSSIAN FEDERATION  
Federal State Autonomous Educational Institution of Higher Education  
**"Far Eastern Federal University"**  
(FEFU)  
**INSTITUTE OF MATHEMATICS AND COMPUTER TECHNOLOGIES**  
(SCHOOL)

AGREED

Head of Educational  
program

Shichalina V.A.

CONFIRM

Director of the Department of Information  
and Computer Systems



WORKING PROGRAM OF THE DISCIPLINE

**Data analysis and machine learning**

*Area of study 09.03.02 Information systems and technologies (Digital footprint analytics)*

*Form of training: full-time*

The work program was compiled in accordance with the requirements of the Federal State Educational Standard in the field of study 09.03.02 Information systems and technologies, approved by order of the Ministry of Education and Science of the Russian Federation dated September 19, 2017 No. 926 (as amended).

The work program was discussed at a meeting of the Department of Information and Computer Systems, protocol No. 4 of February 03, 2023.

Director of the Department of Information and Computer Systems Fedorets A.N.

Compiled by: Assoc. Ralin A.Yu.

Vladivostok  
2023

Reverse side of the title page of the RPD

*1. The work program was revised at a meeting of the Department of Information and Computer Systems and approved at a meeting of the Department of Information and Computer Systems, protocol dated "" 20\_ No.*

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*2. The work program was revised at a meeting of the Department of Information and Computer Systems and approved at a meeting of the Department of Information and Computer Systems, protocol dated "" 20\_ No.*

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*3. The work program was revised at a meeting of the Department of Information and Computer Systems and approved at a meeting of the Department of Information and Computer Systems, protocol dated "" 20\_ No.*

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*4. The work program was revised at a meeting of the Department of Information and Computer Systems and approved at a meeting of the Department of Information and Computer Systems, protocol dated "" 20\_ No.*

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*5. The work program was revised at a meeting of the Department of Information and Computer Systems and approved at a meeting of the Department of Information and Computer Systems, protocol dated "" 20\_ No.*

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## Discipline abstract

### Data analysis and machine learning

The total labor intensity of the discipline is 5 credits / 180 academic hours. It is a discipline of the part formed by the participants of educational relations, EP, is studied in the 3rd year and ends with an exam. The curriculum provides for lectures in the amount of 18 hours, laboratory work in the amount of 90 hours (including 64 hours in an interactive form), and hours are allocated for independent work of the student - 72 hours (including 27 hours for preparing for exams) .

Implementation language: Russian.

#### Target:

Formation of students' theoretical knowledge and practical skills in the field of data analysis and machine learning, students' mastery of tools, models and methods of machine learning, acquisition of data researcher skills.

#### Tasks:

- study of modern methods of data mining;
- study of the main methods and models for working with data;
- acquisition of skills in data processing, selection and analysis of quality parameters for a specific task, verification and evaluation of the model;
- formation of practical skills in the application of data analysis algorithms in machine learning;
- development of software development skills using the capabilities of modern libraries for data analysis and machine learning;
- development of debugging and software testing skills. Planned learning outcomes in the discipline, correlated with the planned

the results of mastering the educational program, characterize the formation of the following competencies:

Task type	Code and name professional competencies (result of development)	Code and name indicator achievements competencies	Name of indicator assessment (learning outcome by discipline)
production technologist tasks	PC-4 Capable develop software provision with using languages programming, definitions and manipulation data	PC-4.1 Capable describe the requirements for programmatic provision from the point view of architecture	Knows the architecture, device and functioning of modern information systems Ability to analyze architecture device and operation modern information systems Proficient in analysis architecture, devices and functioning information systems for the purpose choosing the optimal information configuration systems

		PC-4.2 Applies methods and means design software provision,	Knows the basic methods and means software design ensure Ability to apply methods design tools
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		<p>data structures, databases data, program interfaces</p>	<p>software, data structures, databases, software interfaces Has application skills design methods and tools software, data structures, databases, software interfaces</p>
		<p>PC-4.3 Develops integrated software security, interfaces interactions</p>	<p>Knows tools and techniques development of an integrated software Ability to design and create integrated software software, interfaces interactions Possesses development skills integrated software software, interfaces interactions</p>
<p>production technologists chessky</p>	<p>PC-5 Capable conduct testing, prepare and apply test sets data</p>	<p>PC-5.1 Understands process  testing software provision and life cycle software product</p>	<p>Knows basic methods software testing  ensure Can analyze the process software testing ensure Proficient in analysis testing process software and software life cycle product</p>
		<p>PC-5.2 Capable enjoy special programmatic provision for automated testing</p>	<p>Knows the main types special software provision for automated testing Able to customize special software provision for automated testing Has the skills to use special software provision for automated testing</p>
		<p>PC-5.3 Capable compare and analyze, on one's own find information necessary for</p>	<p>Knows the general principles system failure recovery Can match and analyze on your own find information, needed to restore systems after failure</p>

		recovery systems after failure	Proficient in analysis and search for information needed for system recovery after failure
production tvenno- technologist s chesky	PC-7 Capable analyze  digital footprint person (group people) and information and	PC-7.1 Collects and prepares  digital data trace for holding analysis	Knows the structure and sources digital footprint, methods  data preprocessing Ability to collect and digital data preprocessing trace

	communication systems		Skilled in collecting and digital data preparation trace for analysis
		PC-7.2 Checks hypotheses and reveal patterns in data arrays	Knows processing algorithms data, software, libraries and frameworks for data analysis Ability to apply algorithms data processing, specialized software data analysis software Possesses verification skills hypotheses and search for patterns in data arrays
		PC-7.3 renders analysis results digital footprint	Knows visual techniques data display, specialized software visualization software data Knows how to apply specialized software software, libraries and visualization frameworks data Possesses visualization skills digital trace
production venno-technologists chesky	PC-8 Capable conduct analytical research with application big technologies data	PC-8.1 Defines sources of great data for analysis, retrieve, check and clear the data	Knows the sources of big data, storage and processing technologies  big data Able to extract cleaning, integration and large volume conversion data Possesses skills of definition big data sources for analysis, extraction skills, data validation and cleaning
		PC-8.2 Analyzes and choose methods and instrumental analysis tools big data	Knowledge of theoretical and applied basics of big data analysis, modern methods and tools big data analysis Ability to select appropriate methods and instrumental tools for analyzing large data Proficient in comparative analysis and informed choice methods and instrumental big data analytics
		PC-8.3 Conducts analytical	Knowledge of theoretical and applied basics of big data analysis,

		work with using big technologies data	data analysis technologies Ability to plan and execute analytical work with technology big data Has the skills to conduct analytical work with technology big data
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I.Goals and objectives of mastering the discipline:

**Target:**

Formation of students' theoretical knowledge and practical skills in the field of data analysis and machine learning, students' mastery of tools, models and methods of machine learning, acquisition of data researcher skills.

**Tasks:**

- study of modern methods of data mining;
- study of the main methods and models for working with data;
- acquisition of skills in data processing, selection and analysis of quality parameters for a specific task, verification and evaluation of the model;
- formation of practical skills in the application of data analysis algorithms in machine learning;
- development of software development skills using the capabilities of modern libraries for data analysis and machine learning;
- development of debugging and software testing skills.

The place of the discipline in the structure of the OBEP HE (in the curriculum):

The total labor intensity of the discipline is 5 credits / 180 academic hours. It is a discipline of the part formed by the participants of educational relations, EP, is studied in the 3rd year and ends with an exam. The curriculum provides for lectures in the amount of 18 hours, laboratory work in the amount of 90 hours (including 64 hours in an interactive form), and hours are allocated for independent work of the student - 72 hours (including 27 hours for preparing for exams) .

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Task type

production and technological

Code and name professional competencies (result of development)	Code and name indicator achievements competencies	Name of indicator assessment (learning outcome by discipline)
PC-4 Capable  develop software  provision with using languages programming, definitions and manipulation data	PC-4.1 Capable describe the requirements for programmatic provision from the point view of architecture	Knows the architecture, device and functioning of modern information systems  Ability to analyze architecture device and operation modern information systems Proficient in analysis architecture, devices and functioning information systems for the purpose choosing the optimal information configuration systems
	PC-4.2 Applies methods and means design software provision, data structures, databases data, program interfaces	Knows the basic methods and means software design ensure Ability to apply methods design tools  software, data structures, databases, software interfaces Has application skills

			design methods and tools software, data structures, databases, software interfaces
		PC-4.3 Develops integrated software security, interfaces interactions	Knows tools and techniques development of an integrated software Ability to design and create integrated software software, interfaces interactions Possesses development skills integrated software software, interfaces interactions
production technologists chessky	PC-5 Capable conduct testing, prepare and apply test sets data	PC-5.1 Understands process testing software provision and life cycle software product	Knows basic methods software testing ensure Can analyze the process software testing ensure Proficient in analysis testing process software and software life cycle product
		PC-5.2 Capable enjoy special programmatic provision for automated testing	Knows the main types special software provision for automated testing Able to customize special software provision for automated testing Has the skills to use special software provision for automated testing
		PC-5.3 Capable compare and analyze, on one's own find information necessary for recovery systems after failure	Knows the general principles system failure recovery Can match and analyze on your own find information, needed to restore systems after failure Proficient in analysis and search for information needed for system recovery after failure
production	PC-7 Capable	PC-7.1 Collects and	Knows the structure and sources

tvenno- technologist s chesky	analyze digital footprint person (group people) and information and communication systems	prepares	digital footprint, methods
		digital data trace for holding analysis	data preprocessing Ability to collect and digital data preprocessing trace Skilled in collecting and digital data preparation trace for analysis
		PC-7.2 Checks	Knows processing algorithms

		hypotheses and reveal patterns in data arrays	data, software, libraries and frameworks for data analysis Ability to apply algorithms data processing, specialized software data analysis software Possesses verification skills hypotheses and search for patterns in data arrays
		PC-7.3 renders analysis results digital footprint	Knows visual techniques data display, specialized software visualization software data Knows how to apply specialized software software, libraries and visualization frameworks data Possesses visualization skills digital trace
production technologists chessky	PC-8 Capable conduct analytical research with application big technologies data	PC-8.1 Defines sources of great data for analysis, retrieve, check and clear the data	Knows the sources of big data, storage and processing technologies  big data Able to extract cleaning, integration and large volume conversion data Possesses skills of definition big data sources for analysis, extraction skills, data validation and cleaning
		PC-8.2 Analyzes and choose methods and instrumental analysis tools big data	Knowledge of theoretical and applied basics of big data analysis, modern methods and tools big data analysis Ability to select appropriate methods and instrumental tools for analyzing large data Proficient in comparative analysis and informed choice methods and instrumental big data analytics
		PC-8.3 Conducts analytical work with using big technologies data	Knowledge of theoretical and applied basics of big data analysis, data analysis technologies Ability to plan and execute analytical work with technology

			big data Has the skills to conduct analytical work with technology big data
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## II. The complexity of the discipline

The total labor intensity of the discipline is 5 credit units (180 academic hours).

### III. Discipline structure:

Full-time form of education.




*No*      *Section name*  
*disciplines*

- 1*    *Section 1. Fundamentals of data analysis*
  - 2*    *Section 2. Classical methods of machine learning*
- Total*

*Semester*

5

5

*The number of hours by type of training sessions and work of the student*

<i>Lek</i>	<i>Lab</i>	<i>Etc</i>	<i>OK</i>	<i>SR</i>	<i>Control</i>
6	thirty			45	27
12	60				
18	90			45	27

*Forms  
intermediate  
Ouch  
attestations*

*exam*

## IV.CONTENT OF THE THEORETICAL PART OF THE COURSE

Section 1. Fundamentals of data analysis (6 hours)

Topic 1.1 Python for data analysis (2 hours)

Repetition of the basics of programming in the Python language. Specialized Python libraries for data analysis (Pandas, NumPy, SciPy).

Topic 1.2 Data analysis and visualization (4 hours)

Basic descriptive statistics, basic data visualization methods, dimensionality reduction methods. Principal component method. Data normalization. Data preprocessing. Working with missing values.

Section 2. Classical methods of machine learning (12 hours)

Topic 2.1 Fundamentals of Machine Learning (4 hours)

Statement of the problem of machine learning. Main types and classification of machine learning problems. Training with a teacher. Separation of data into training and test. Data normalization. Determination of model overfitting. Criteria for assessing the quality of the obtained models.

Topic 2.2 Tasks of classification (2 hours)

Statement of the problem of classification, review of the main methods of its solution. Binary and multiclass classification. logistic regression. decision trees. Quality metrics in classification problems (accuracy/specificity, ROC-curve, area under the curve).

Topic 2.3 Regression problems (2 hours)

Statement of the regression problem. Linear regression analysis. feature selection, collinearity, influential observations, residual analysis. L1 and L2 regularization. Quality metrics in regression problems.

Topic 2.4 Clustering tasks (2 hours)

Training on unlabeled data. Clustering. Hierarchical clustering. Methods kNN, K-means, DBSCAN.

Topic 2.5 Compositions of models (2 hours)

Ensembles of machine learning algorithms. Model aggregation. Ensembles of decision trees. Random forest. Gradient boosting.

## V.CONTENT OF THE PRACTICAL PART OF THE COURSE

### Practical lessons

Practical classes are not provided.

### Laboratory works

Lab #1: Python Fundamentals (10 hours)

Objective: Review the basics of the Python language required for further laboratory work (data typing, branching, loops, functions, exceptions).

Lab #2 Pandas Basics (10 hours)

Goal: to gain basic skills in using the Pandas library and visualizing data in datasets using the matplotlib and seaborn libraries.

Lab 3: Data Analysis with Pandas (10 hours)

Purpose: to learn how to analyze and process data using Pandas (slicing, grouping, indexing data by different parameters, visualization).

Lab 4. k-Nearest Neighbor Classification (10 hours) Objective: To learn the simplest k-nearest neighbor data classification method (sklearn library).

Lab #5: Building a Decision Tree (10 hours)

Purpose: to implement a decision tree model and analyze its advantages and disadvantages, in particular, the tendency to overfit.

Lab #6 Linear Regression (10 hours)

Purpose: to build a linear regressor model, train the model and make a prediction based on it.

Laboratory work No. 7. Regularization in regression problems (10 hours)

Purpose: to study the purpose and features of the operation of L1 and L2 regularizers.

Laboratory work № 8. Clustering methods (10 hours)

Purpose: to learn how to apply the clustering methods implemented in the sklearn library.

Laboratory work No. 9. Compositions of models (10 hours)

Purpose: to learn how to build model compositions using random forest and gradient boosting methods.

## VI.CONTROL OF ACHIEVEMENT OF COURSE OBJECTIVES

No. p/p	controlled sections/topics disciplines	Code and Name indicator	Learning Outcomes	Estimated facilities *	
				Current	Intermedi

		achievements		th control	a weft certificate
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<p>All sections and Topics.</p>	<p>PC-4.1 Capable describe requirements to programmatic ensure with points of view architecture</p>	<p>Knows architecture device and functioning contemporary information systems  Can analyze architecture, device and functioning contemporary information systems  Proficient in analysis architecture, devices and functioning information systems with purpose of choice optimal configuration information system</p>	<p>b  UO-1  PR-7</p>	<p>tion  -</p>
	<p>PC-4.2 Applies methods and means design software provision, data structures, databases, program interfaces</p>	<p>Knows basic techniques and design tools software  Ability to apply methods design tools software support, structures data, databases, software interfaces  Skilled application of methods and design tools software support, structures data, databases, software interfaces</p>	<p>UO-1  PR-7</p>	<p>-</p>
	<p>PC-4.3 Develops integrated software security, interfaces interactions</p>	<p>Knows tools and development methodology integrated software  Ability to design and create an integrated software, interfaces interactions  Skilled development integrated software</p>	<p>UO-1  PR-7</p>	<p>-</p>

	software, interfaces interactions		
PC-5.1 Understands process testing software	Knows basic methods testing software Can analyze	UO-1 PR-7	-

		provision and life cycle software product	testing process software Proficient in analysis testing process software and life cycle software product		
		PC-5.2 Capable enjoy special programmatic provision for automated th testing	Knows the main types special software for automated testing Can perform setting a special software for automated testing Skilled use special software for automated testing	UO-1 PR-7	-
		PC-5.3 Capable compare and analyze, on one's own find information necessary for recovery systems after failure	Knows the general principles system recovery after crash Can match and analyze, independently find information necessary for system recovery after crash Proficient in analysis and search for information necessary for system recovery after crash	UO-1 PR-7	-
		PC-7.1 Collects and prepares digital data trace for holding analysis	knows the structure and sources of digital trace, methods data preprocessing Ability to collect and data preprocessing digital footprint Skilled in collecting and data preparation digital footprint for	UO-1 PR-7	-

			analysis		
		PC-7.2 Checks hypotheses and reveals patterns in data arrays	Knows algorithms data processing, software, libraries and frameworks for data analysis Knows how to apply	UO-1 PR-7	-
			processing algorithms data, specialized software for data analysis Skilled hypothesis testing and search patterns in data arrays		
		PC-7.3 renders results analysis digital footprint	Knows visual techniques data display, specialized software for data visualization Knows how to apply specialized software, libraries and frameworks for data visualization Skilled visualization of results digital footprint analysis	UO-1 PR-7	-
		PC-8.1 Defines sources big data for analysis, extracts, checks and clears data	Knows the sources of data, technology storage and processing big data Can produce extraction, cleaning, integration and large conversion volumes of data Skilled source definitions big data for analysis, skills extraction, verification and data cleaning	UO-1 PR-7	-
		PC-8.2 Analyzes and chooses methods And instrumental analysis tools big data	Knows theoretical and applied fundamentals big data analysis, modern methods and instrumental large data Knows how to choose appropriate methods	UO-1 PR-7	-

			and instrumental analysis tools big data Skilled benchmarking and informed choice methods and tools big data analysis		
		PC-8.3 Conducts analytical work with using technologies	Knows theoretical and applied fundamentals big data analysis, analysis technologies data	UO-1 PR-7	-
		big data	Can plan and conduct analytical work using big technologies data Skilled analytical works using big technologies data		
	exam	PC-4.1; PC-4.2; PC-4.3; PC-5.1; PC-5.2; PC-5.3; PC-7.1; PC-7.2; PC-7.3; PC-8.1; PC-8.2; PC-8.3		-	UO-1

\* Forms of assessment tools: interview / oral survey (LO-1) laboratory work (WP-7)

## VII. EDUCATIONAL AND METHODOLOGICAL SUPPORT FOR INDEPENDENT WORK

### STUDENTS

Independent work is defined as an individual or collective learning activity carried out without the direct guidance of a teacher, but according to his instructions and under his control. Independent work is a cognitive learning activity, when the sequence of a student's thinking, his mental and practical operations and actions depends and is determined by the student himself.

Independent work of students contributes to the development of independence, responsibility and organization, a creative approach to solving educational problems. It leads to professional levels, which ultimately leads to the development of the skill of independent planning and implementation of activities.

Registration of reports on laboratory and practical exercises, term paper in accordance with GOST 7.32-2017.

The purpose of independent work of students is to master the necessary competencies in their field of study, experience in creative and research activities.

Forms of independent work of students:

- work with basic and additional literature, Internet resources;
- self-acquaintance with the lecture material presented on electronic media in the library of an educational institution;
- preparation of abstract reviews of sources of periodicals, reference

конспектов, заранее определенных преподавателем;

- поиск информации по теме с последующим ее представлением в аудитории в форме доклада, презентаций;
  - подготовка к выполнению аудиторных контрольных работ;
  - выполнение домашних контрольных работ;
  - выполнение тестовых заданий, решение задач;
  - составление кроссвордов, схем;
- подготовка сообщений к выступлению на семинаре, конференции;
  - заполнение рабочей тетради;
  - написание эссе, курсовой работы;
  - подготовка к деловым и ролевым играм;
  - составление резюме;
  - подготовка к зачетам и экзаменам;
- другие виды деятельности, организуемые и осуществляемые образовательным учреждением и органами студенческого самоуправления.

Учебно-методическое обеспечение самостоятельной работы обучающихся по дисциплине включает в себя план-график выполнения самостоятельной работы по дисциплине.

*План-график выполнения самостоятельной работы по дисциплине*

№ п/п	Дата/сроки выполнения	Вид самостоятельной работы	Примерные нормы времени на выполнение	Форма контроля
1.	В течение семестра	Подготовка к занятиям: изучение литературы, оформление результатов работ/заданий.	45 часов	
2.	16-18 неделя семестра	Подготовка к экзамену.	27 часов	Экзамен
	<i>Итого</i>		<i>72 часа</i>	

Самостоятельная работа по дисциплине включает в себя подготовку к лабораторным занятиям (изучение литературы) и подготовку к промежуточной аттестации по дисциплине.

Рекомендуется использовать различные возможности работы с литературой: фонды

scientific library of FEFU (<http://www.dvfu.ru/library/>) and other leading universities of the country, as well as scientific library systems available for use.

## VIII. REFERENCES AND INFORMATIONAL AND METHODOLOGICAL ENFORCING DISCIPLINE

### Main literature

1. Zamyatin, A. V. Data mining: a tutorial / A. V. Zamyatin. - Tomsk: Publishing House of Tomsk State University, 2020. - 194 c. - url: <https://www.iprbookshop.ru/116889.html>
2. Kurnosov, M. G. Introduction to methods of machine data processing / M. G. Kurnosov. - Novosibirsk: Autograph, 2020. - 227 p. - url: <https://www.iprbookshop.ru/102117.html>
3. McKinley, W. Python and data analysis [Electronic resource] / W. McKinley. - Saratov: Vocational education, 2019. - 482 p. - Access mode: <https://www.iprbookshop.ru/88752.html>
4. Protodyakonov, A. V. Data Science Algorithms and Their Practical Implementation in Python : Tutorial / A. V. Protodyakonov, P. A. Pylov, V. E. Sadovnikov. - Moscow, Vologda: Infra-Engineering, 2022. - 392 p. — URL: <https://www.iprbookshop.ru/124000.html>
5. Chubukova, I. A. Data Mining: textbook / I. A. Chubukova. - 3rd ed. — Moscow, Saratov : Internet University of Information Technologies (INTUIT), IP Ar Media, 2020. - 469 p. - url: <https://www.iprbookshop.ru/89404.html>

### additional literature

1. Zheleznov, M. M. Methods and technologies for processing big data: educational methodical manual / M. M. Zheleznov. - Moscow: MISI-MGSU, EBS DIA, 2020. — 46 c. - url: <https://www.iprbookshop.ru/101802.html>
2. Zhukov, R. A. Python programming language: workshop [Electronic resource]: study guide / R.A. Zhukov. - M. : INFRA-M, 2022. - 216 p. - Access mode: <https://znanium.com/catalog/product/1689648>
3. Kumratova, A. M. Methods of data storage and analysis: textbook / A. M. Kumratov. - Moscow: IP Ar Media, 2022. - 143 p. - url: <https://www.iprbookshop.ru/119065.html>
4. Obukhov, A.D. System analysis and information processing in intelligent systems: a tutorial / A.D. Obukhov, I.L. Korobova. - Tambov: Tambov State Technical University, EBS DIA, 2020. - 80 p. - url: <https://www.iprbookshop.ru/115744.html>
5. Khaleeva, E. P. Data analysis by means of the R language: a tutorial / E. P. Khaleeva, M. A. Al-Khanani, M. N. Lyutikova. - Saratov: University education, 2022. - 71 c. - url: <https://www.iprbookshop.ru/119442.html>

List of resources of the information and telecommunications network "Internet"



1. <http://machinelearning.ru/> MachineLearning.ru Professional information and analytical resource dedicated to machine learning, pattern recognition and

интеллектуальному анализу данных.

2. Электронная библиотечная система «Университетская библиотека – online»: специализируется на учебных материалах для ВУЗов по научно-гуманитарной тематике, а также содержит материалы по точным и естественным наукам:  
<http://www.biblioclub.ru/>
3. Электронная библиотека online статей по информационным технологиям. Удобный поиск по разделам, отдельным темам: <http://www.citforum.ru/>
4. Интернет-библиотека образовательных изданий. Собраны электронные учебники, справочные и учебные пособия: <http://www.iqlib.ru/>
5. Портал Ассоциации Предприятий Компьютерных и Информационных Технологий (АКИТ): <http://www.apkit.ru>
6. Курс «Введение в анализ данных»  
<https://www.youtube.com/playlist?list=PLrCZzMib1e9p6lpNv-yt6uvHGyBxQncEh>
7. Открытый курс OpenDataScience и Mail.ru Group по машинному обучению  
[https://www.youtube.com/playlist?list=PLZSPcxXPEZVoaCDSSEtrrSq2i\\_ewYqrzZE](https://www.youtube.com/playlist?list=PLZSPcxXPEZVoaCDSSEtrrSq2i_ewYqrzZE)

#### Перечень информационных технологий и программного обеспечения

При осуществлении образовательного процесса по дисциплине используется общее программное обеспечение компьютерных учебных классов (Windows 10, Microsoft Office и др.), а также пакет Anaconda.

### IX. МЕТОДИЧЕСКИЕ УКАЗАНИЯ ПО ОСВОЕНИЮ ДИСЦИПЛИНЫ

Успешное освоение дисциплины предполагает активную работу студентов на всех занятиях аудиторной формы: лекциях и практиках, выполнение аттестационных мероприятий. В процессе изучения дисциплины студенту необходимо ориентироваться на проработку лекционного материала, подготовку к практическим занятиям, выполнение контрольных и творческих работ.

Освоение дисциплины предполагает рейтинговую систему оценки знаний студентов и предусматривает со стороны преподавателя текущий контроль за посещением студентами лекций, подготовкой и выполнением всех практических заданий, выполнением всех видов самостоятельной работы.

Промежуточной аттестацией по дисциплине является *экзамен*.

Студент считается аттестованным по дисциплине при условии выполнения всех видов текущего контроля и самостоятельной работы, предусмотренных учебной программой.

Шкала оценивания сформированности образовательных результатов по дисциплине представлена в фонде оценочных средств (ФОС).

X. МАТЕРИАЛЬНО-ТЕХНИЧЕСКОЕ ОБЕСПЕЧЕНИЕ ДИСЦИПЛИНЫ

Учебные занятия по дисциплине проводятся в помещениях, оснащенных

appropriate hardware and software.

The list of material, technical and software of the discipline is given in the table.

Logistics and software discipline

Name special premises and premises for independent work	Equipment of special rooms and premises for training lessons, self-study	List of licensed software. Details of the confirming document
Classrooms for conducting training sessions:		
<p>690922, Primorsky region, Vladivostok, russian island, peninsula Saperny, village Ajax, 10, building D, D208/347, D303, D313a, D401, D453, D461, D518, D708, D709, D758, D761, D762, D765, D766, D771, D917, D918, D920, D925, D576, D807</p>	<p>The lecture hall is equipped whiteboard, audio player</p>	<p>IBM SPSS Statistics Premium campus edition. Supplier CJSC predictive solutions. Contract EA-442-15 dated 01/18/2016 d. License - indefinitely. SolidWorks Campus 500. Supplier Solid Works R. Agreement 15-04-101 dated December 23, 2015 License - indefinitely. ASCON Compass 3D v17. Provider Navik. Agreement 15-03-53 dated December 20, 2015 License - indefinitely. MathCad Education Universe Edition. Provider Soft Line Trade. Contract 15-03-49 dated 02.12.2015 License - indefinitely. Windows Edu Per Device 10 Education. Provider Microsoft. Agreement No. EA-261-18 dated June 30, 2018 Validity period contracts from 30.06.2018 Office Professional Plus 2019. Vendor Microsoft. Contract No. EA261-18 dated 06/30/2018 License - indefinitely. AutoCAD 2018. Autodesk vendor. Agreement No. 110002048940 dated 10/27/2018 Network, competitive. Term the validity of the contract from 27.10.2018 Sublicense Agreement Blackboard No. 2906/1 dated 06/29/2012</p>
<p>690922, Primorsky region, Vladivostok,</p>		<p>IBM SPSS Statistics Premium campus edition. Supplier CJSC</p>

<p>russian island, peninsula Saperny, village Ajax, 10, building D, D229, D304, D306,  D349, D350, D351, D352, D353, D403, D404, D405, D414, D434, D435, D453, D503, D504, D517, D522, D577, D578, D579, D580, D602, D603, D657, D658,</p>	<p>Multimedia Audience: Projector Mitsubishi EW330U, Projection screen ScreenLine Trim White Ice, professional LCD panel 47", 500 cd/m2, Full HD M4716CCBA LG subsystem  Document Camera CP355AF Avervision; video switching subsystem; audio switching subsystem and sound amplification; interactive management</p>	<p>predictive solutions. Contract EA-442-15 dated 01/18/2016 d. License - indefinitely. SolidWorks Campus 500. Supplier Solid Works R. Agreement 15-04-101 dated December 23, 2015 License - indefinitely. ASCON Compass 3D v17. Provider Navik. Agreement 15-03-53 dated December 20, 2015 License - indefinitely. MathCad Education Universe Edition. Provider Soft Line Trade. Contract 15-03-</p>
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<p>D702, D704, D705, D707, D721, D722, D723, D735, D736, D764, D769, D770, D773, D810, D811, D906, D914, D921, D922, D923, D924,</p> <p>D926</p>		<p>49 dated 02.12.2015 License - indefinitely. Windows Edu Per Device 10 Education. Provider Microsoft. Agreement No. EA-261-18 dated June 30, 2018 Validity period contracts from 30.06.2018 Office Professional Plus 2019. Vendor Microsoft. Contract No. EA261-18 dated 06/30/2018 License - indefinitely. AutoCAD 2018. Autodesk vendor. Agreement No. 110002048940 dated 10/27/2018 Network, competitive. Term the validity of the contract from 27.10.2018 Sublicense Agreement Blackboard No. 2906/1 dated 06/29/2012</p>
<p>690922, Primorsky region, Vladivostok, russian island, peninsula Saperny, village Ajax, 10, building D, D207/346</p>	<p>Multimedia auditorium: Projector 3-chip DLP, 10 600 ANSI-lm, WUXGA 1 920x1 200 (16:10) PT-DZ110XE Panasonic; screen 316x500 cm, 16:10 c el. driven; fastening wall-ceiling Elpro Large Electrol projecta; professional LCD panel 47", 500 cd/m2, Full HD M4716CCBA LG; document-video source subsystem CP355AF Avervision camera; subsystem video switching; subsystem audio switching and sound amplification; interactive control subsystem),</p>	<p>IBM SPSS Statistics Premium campus edition. Supplier CJSC predictive solutions. Contract EA-442-15 dated 01/18/2016 d. License - indefinitely. SolidWorks Campus 500. Supplier Solid Works R. Agreement 15-04-101 dated December 23, 2015 License - indefinitely. ASCON Compass 3D v17. Provider Navik. Agreement 15-03-53 dated December 20, 2015 License - indefinitely. MathCad Education Universe Edition. Provider Soft Line Trade. Contract 15-03-49 dated 02.12.2015 License - indefinitely. Windows Edu Per Device 10 Education. Provider Microsoft. Agreement No. EA-261-18 dated June 30, 2018 Validity period contracts from 30.06.2018 Office Professional Plus 2019. Vendor Microsoft. Contract No. EA261-18 dated 06/30/2018 License - indefinitely. AutoCAD 2018. Autodesk vendor. Agreement No. 110002048940 dated 10/27/2018 Network, competitive. Term the validity of the contract from 27.10.2018 Sublicense Agreement</p>

		Blackboard No. 2906/1 dated 06/29/2012
<p>690922, Primorsky region, Vladivostok, russian island, peninsula Saperny, village Ajax, 10, building D, D226</p>	<p>Multimedia Audience: Projector Mitsubishi EW330U, Projection screen ScreenLine Trim White Ice, professional LCD panel 47", 500 cd/m2, Full HD M4716CCBA LG subsystem video switching; subsystem audio switching and sound amplification; interactive control subsystem), D362 (professional LCD panel 47", 500 cd/m2, Full HD M4716CCBA LG, subsystem audio switching and sound amplification; Computer class for 15 seats</p>	<p>IBM SPSS Statistics Premium campus edition. Supplier CJSC predictive solutions. Contract EA-442-15 dated 01/18/2016 d. License - indefinitely. SolidWorks Campus 500. Supplier Solid Works R. Agreement 15-04-101 dated December 23, 2015 License - indefinitely. ASCON Compass 3D v17. Provider Navik. Agreement 15-03-53 dated December 20, 2015 License - indefinitely. MathCad Education Universe Edition. Provider Soft Line Trade. Contract 15-03-49 dated 02.12.2015 License -</p>

		<p>indefinitely. Windows Edu Per Device 10 Education. Provider Microsoft. Agreement No. EA-261-18 dated June 30, 2018 Validity period contracts from 30.06.2018 Office Professional Plus 2019. Vendor Microsoft. Contract No. EA261-18 dated 06/30/2018 License - indefinitely. AutoCAD 2018. Autodesk vendor. Agreement No. 110002048940 dated 10/27/2018 Network, competitive. Term the validity of the contract from 27.10.2018 Sublicense Agreement Blackboard No. 2906/1 dated 06/29/2012</p>
<p>690922, Primorsky region, Vladivostok, russian island, peninsula Saperny, village Ajax, 10, building D, D447, D448, D449, D450, D451, D452, D502, D575</p>	<p>Multimedia Audience: Projector Mitsubishi EW330U, Projection screen ScreenLine Trim White Ice Subsystem Document Camera CP355AF Avervision; video switching subsystem; audio switching subsystem and sound amplification; interactive management</p>	<p>IBM SPSS Statistics Premium campus edition. Supplier CJSC predictive solutions. Contract EA-442-15 dated 01/18/2016 d. License - indefinitely. SolidWorks Campus 500. Supplier Solid Works R. Agreement 15-04-101 dated December 23, 2015 License - indefinitely. ASCON Compass 3D v17. Provider Navik. Agreement 15-03-53 dated December 20, 2015 License - indefinitely. MathCad Education Universe Edition. Provider Soft Line Trade. Contract 15-03-49 dated 02.12.2015 License - indefinitely. Windows Edu Per Device 10 Education. Provider Microsoft. Agreement No. EA-261-18 dated June 30, 2018 Validity period contracts from 30.06.2018 Office Professional Plus 2019. Vendor Microsoft. Contract No. EA261-18 dated 06/30/2018 License - indefinitely. AutoCAD 2018. Autodesk vendor. Agreement No. 110002048940 dated 10/27/2018 Network, competitive. Term the validity of the contract from 27.10.2018 Sublicense Agreement Blackboard No. 2906/1 dated</p>



<p>690922, Primorsky region, Vladivostok, russian island,</p> <p>peninsula Saperny, village Ajax, 10, building D, D446, D604, D656, D659, D737, D808, D809, D812</p>	<p>Multimedia Audience: Projector Mitsubishi EW330U, Projection screen ScreenLine Trim White Ice, professional LCD panel 47", 500 cd/m2, Full HD M4716CCBA LG subsystem Document Camera CP355AF Avervision; video switching subsystem;</p> <p>audio switching subsystem and sound amplification; interactive management; Computer class; Working place: Computers (Solid State Disk - 128 GB; Hard disk - volume 1000 GB; Form factor - Tower); completed keyboard, mouse. AOS monitor i2757Fm; set of cords nutrition) Model - M93r 1; language class, computers are equipped with software</p>	<p>06/29/2012</p> <p>IBM SPSS Statistics Premium campus edition. Supplier CJSC predictive solutions. Contract EA-442-15 dated 01/18/2016 d. License - indefinitely. SolidWorks Campus 500. Supplier Solid Works R. Agreement 15-04-101 dated December 23, 2015 License - indefinitely. ASCON Compass 3D v17. Provider Navik. Agreement 15-03-53 dated December 20, 2015 License - indefinitely. MathCad Education Universe Edition. Provider Soft Line Trade. Contract 15-03-49 dated 02.12.2015 License - indefinitely. Windows Edu Per</p>
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	<p>complex Sanako study 1200</p>	<p>Device 10 Education. Provider Microsoft. Agreement No. EA-261-18 dated June 30, 2018 Validity period contracts from 30.06.2018 Office Professional Plus 2019. Vendor Microsoft. Contract No. EA261-18 dated 06/30/2018 License - indefinitely. AutoCAD 2018. Autodesk vendor. Agreement No. 110002048940 dated 10/27/2018 Network, competitive. Term the validity of the contract from 27.10.2018 Sublicense Agreement Blackboard No. 2906/1 dated 06/29/2012</p>
<p>690922, Primorsky region, Vladivostok, russian island, peninsula Saperny, village Ajax, 10, building D, D501, D601</p>	<p>Multimedia Audience: Projector Mitsubishi EW330U, Projection screen ScreenLine Trim White Ice, professional LCD panel 47", 500 cd/m2, Full HD M4716CCBA LG subsystem Document Camera CP355AF Avervision; video switching subsystem; audio switching subsystem and sound amplification; interactive management; Computer class for 26 work places. Workplace: Monoblock Lenovo C360G-i34164G500UDK</p>	<p>IBM SPSS Statistics Premium campus edition. Supplier CJSC predictive solutions. Contract EA-442-15 dated 01/18/2016 d. License - indefinitely. SolidWorks Campus 500. Supplier Solid Works R. Agreement 15-04-101 dated December 23, 2015 License - indefinitely. ASCON Compass 3D v17. Provider Navik. Agreement 15-03-53 dated December 20, 2015 License - indefinitely. MathCad Education Universe Edition. Provider Soft Line Trade. Contract 15-03-49 dated 02.12.2015 License - indefinitely. Windows Edu Per Device 10 Education. Provider Microsoft. Agreement No. EA-261-18 dated June 30, 2018 Validity period contracts from 30.06.2018 Office Professional Plus 2019. Vendor Microsoft. Contract No. EA261-18 dated</p>
		<p>06/30/2018 License - indefinitely. AutoCAD 2018. Autodesk vendor. Agreement No. 110002048940 dated 10/27/2018 Network, competitive. Term the validity of the contract from 27.10.2018 Sublicense Agreement Blackboard No. 2906/1 dated 06/29/2012</p>

Rooms for independent work:

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690922, Primorsky Territory, Vladivostok, Russky Island, Saperny Peninsula, Ayaks village, 10,  
building A, A1042 classroom for independent work of students

Monoblock Lenovo C360G-i34164G500UDK - 115 pcs.; Integrated touch  
Polymedia FlipBox display; Xerox WorkCentre 5330 (WC5330C) 4-Tray Color Scanner-to-E-mail Copier-  
Printer-Scanner (WC5330C; Xerox WorkCentre 7530 Full-Color Copier-Printer-Scanner (WC7530CPS) ;  
Focus-80 Blue Braille display; Lenovo ThinkCentre E73z workstation – 3 pcs.; ONYX Swing-Arm PC  
edition video magnifier; Touch Memo digital marker-voice recorder; PEarl portable flat-printing device;

Microsoft Windows 7 Pro MAGic 12.0 Pro, Jaws for Windows 15.0 Pro, Open book 9.0, Duxbury BrailleTranslator, Dolphin Guide (Contract No. A238-14/2); Non-exclusive rights to use Microsoft software for user workstations (contract EA-261-18 dated August 2, 2018): - license for a client operating system; - license for a package of office products for working with documents, including the format .docx, .xlsx, .vsd, .ppt .; - license for the right to connect

	<p>Scanning and reading machine for blind and visually impaired users  SARA; Braille printer Emprint SpotDot - 2 PC.; Braille Printer Everest - D V4; Video magnifier ONYX Swing-Arm PC edition; Video magnifier Topaz 24" XL stationary electronic; educational system for children tactile-speech, or for people with disabilities health; RUBY Hand Video Magnifier portable - 2 pcs.; Samsung screen S23C200B; Touch Memo Marker Voice Recorder digital.</p>	<p>user to server operating systems used in FEFU: Microsoft Windows Server 2008/2012; - license to connect to Microsoft Exchange Server Enterprise; - license for law connection to the internal information system document management and portal with search capability lots of information remote and local repositories, resources, information libraries, including portal storages, used in FEFU: Microsoft SharePoint; - license for the right system connections centralized management workstations, used in FEFU: Microsoft system center.</p>
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