Federal State Autonomous Educational Institution for Higher Education
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA NAMED AFTER PATRICE LUMUMBA
(RUDN University)

Higher School of Management

(faculty/institute/academy - the higher education program developer)

COURSE SYLLABUS

Data Mining and Decision Making

(name of the discipline/module)

Recommended by the Didactic Council for the Education Field of:

38.04.02 Management

(field of studies / speciality code and title)

The study of the discipline is conducted as part of the professional program of higher education.

Engineering Management

(name (track/specialization) of professional program of higher education)

2024

1. THE GOAL OF THE DISCIPLINE

The goal of mastering the *Data Mining and Decision Making* discipline is to build in students the theoretical knowledge and skills of applying the process approach to enterprise management, as well as practical skills in business process modeling.

2. REQUIREMENTS FOR DISCIPLINE OUTCOMES

The mastering of the *Data Mining and Decision Making* discipline envisages building the following competencies (parts of competencies) in students:

Table 2.1. The list of competencies acquired by students in the course of the discipline (outcomes of the discipline)

Competence Code	Competence Descriptor	Competence Formation Indicators (within this discipline)
GC-3	Ability to perform critical analysis of problematic situations based on the systemic approach and develop a plan of action.	GC-3.1. Know: - economic and mathematical models of the modern market economy; - methods of analysis, synthesis and generalization; GC-3.2. Be able to: - gather and systematize the necessary economic information efficiently; - analyze economic phenomena and processes in their correlation; - to make logical thoughts necessary for effective management decision-making; GC-3.3. Master: - modern methods of economic analysis; - computer technologies for data collection, systematization and processing; - the ability of self-knowledge, self-actualization, self-reflection;
GC-6	Capability to determine and implement the priorities of his/her own activities and ways to improve it based on self-assessment.	GC-6.1 Controls the amount of time spent on specific activities GC-6.2 Develops tools and time management techniques when performing specific tasks, projects, goals GC-6.3 Analyzes its resources and their limits (personal, situational, temporary, etc.) for the successful completion of the task GC-6.4 Allocates tasks for long-, medium- and short-term with justification of relevance and analysis of resources for their implementation
PC-1	Capability to manage the efficiency of an investment project	PC-1.1 Defines the operations and their sequence to implement the investment project. PC-1.2 Evaluates operational, estimates human resources and determines the participants in the investment project PC-1.3 Plans the implementation stages of the investment project, ensures the quality and quality control of the investment project implementation PC-1.4 Can work in specialized computer programs for the preparation and implementation of an investment project PC-1.5 Can search the necessary information for the

Competence Code	Competence Descriptor	Competence Formation Indicators (within this discipline)
		preparation and implementation of an investment project PC-1.6 Can identify and assess the degree (level) of an investment project risks and develop measures to manage them

3. THE PLACE OF DISCIPLINE IN HIGHER EDUCATION PROGRAM STRUCTURE

The *Data Mining and Decision Making* discipline is an elective block formed by students of the B1 unit of the higher education program.

Within the higher education program students also take other disciplines and/or internships that contribute to the achievement of the expected learning outcomes as results of mastering the *Data Mining and Decision Making* program.

Table 3.1. The list of the higher education program components that contribute to the achievement of the expected learning outcomes as the disciplines results.

No	Competence Code and Name	Previous Disciplines	Subsequent Disciplines (Disciplines Groups)
	GC-3	Organization and Production Management	Master's Degree R&D Pre-graduation Practice Preparing for defense and defense of the degree thesis
1.	GC-6,	Strategic Management in Industrial Companies	Master's Degree R&D Pre-graduation Practice Preparing for defense and defense of the degree thesis
Professional Competencies			
3.	PC-1	Innovation Management	Master's Degree R&D Pre-graduation Practice Preparing for defense and defense of the degree thesis

4. SCOPE OF DISCIPLINE AND TYPES OF SCHOLASTIC WORK

The total workload of the discipline is 3 credits.

Table 4.1. Types of educational work according to the periods of mastering the higher education program for FULL-TIME students

	Type of Educational Work		Total hours	Semesters			
				3			
1.	**Classroom classes (total)**		36	36			
	Including:		-	-			
1.1.	Lectures		18	18			
1.2.	Other activities						
	Including:						
1.2.1.	Seminars (C)		18	18			
	Practice training (PT)						

2.	**Autonomous work (total)**		63	63			
	Including:						
2.1.	Calculation and graphic works		-				
	Other types of autonomous work						
	Preparation and passing of midterm assessment		9	9			
3.	**Total workload (acad.hours)**		108	108			
	Total workload (credits)		3	3			

5. DISCIPLINE CONTENT

Table 5.1. The content of the discipline (module) by type of academic work

No	Name of the Discipline Section	Content of the Section (topics)	Type of Educational Work
1.	Business Process as a Research Object	Process approach to company management. Business process characteristics. Mandatory elements of the business process	Lecture, self study
2.	System Analysis of the Organization's Operations	Business processes classification. Eight-process enterprise model. IBM's component business model. eTOM multilevel model of production management business processes. Toyota Model.	Lecture, self study
3.	Modern Approaches to Business Process Modeling	Methods of business processes description. Fundamental business process modeling methodologies. SADT Functional Modeling Methodology. ARIS business process modeling methodology. BPMN Business Process Modeling Methodology.	Lecture, self study
4.	Improvement of the Organization's Operation	Principles and methods of business process analysis and management. Business processes assessment. The main approaches to business processes optimization. Balanced scorecard and key performance indicators in business process management.	Lecture, self study

6. EQUIPMENT AND TECHNOLOGICAL SUPPORT OF THE DISCIPLINE

Table 6.1. Equipment and technological support of the discipline

Classroom Type	**Equipment of the Classroom**	**Specialized Educational/Laboratory Equipment, Software and Materials for the Discipline** (if necessary)
Lecture Hall	An auditorium for conducting lecture-type classes, equipped with a set of specialized furniture; a board (screen) and technical means of multimedia presentations.	21 workplaces: system unit P4 C2D/3160 MHz MB/ 320 GB/DVD±RW/ LCD monitor 19"+ 1 projector

Classroom Type	Equipment of the Classroom	Specialized Educational/Laboratory Equipment, Software and Materials for the Discipline (if necessary)
Colloquium	A classroom for conducting colloquium-type classes, group and individual consultations, ongoing monitoring and midterm assessment, equipped with a set of specialized furniture and multimedia presentation equipment.	21 workplace: Celeron system unit/2600 MHz/1280 MB/ 40 GB/DVD ROM/ LCD monitor 17"+ 1 projector + WiFi access point
Computer Class	A computer classroom for conducting classes, group and individual consultations, continuous control and midterm assessment, equipped with personal computers (___ pcs.), a blackboard (screen) and multimedia presentation technical means.	21 workplace: Celeron system unit/2600 MHz/1280 MB/ 40 GB/DVD ROM/ LCD monitor 17"+ 1 projector + WiFi access point
Autonomous Work of Students	A classroom for autonomous work of students (can be used for seminars and consultations), equipped with a set of specialized furniture and computers with access to EIEE.	21 workplace: Celeron system unit/2600 MHz/1280 MB/ 40 GB/DVD ROM/ LCD monitor 17"+ 1 projector + WiFi access point

7. INFRASTRUCTURE AND INFORMATIONAL SUPPORT NECESSARY FOR THE DISCIPLINE

a) Microsoft Teams software, university telecommunication training and information system of RUDN

a) Main Readings:

1. *Bessmertny, I. A.* Intellektualnye sistemy [Intellectual systems]: textbook and workshop for universities / I. A. Bessmertny, A. B. Nugumanova, A.V. Platonov. — Moscow : Yurayt Publishing House, 2020. - 243 p. — (Higher education). — ISBN 978-5-534-01042-8. — Text : electronic // EBS Yurayt [website]. — URL: https://urait.ru/bcode/451101

2. Fomin, V. I. Informazyonny biznes [Information business] : textbook and workshop for universities / V. I. Fomin. — 4th ed., ispr. and add. — Moscow : Yurayt Publishing House, 2021. - 251 p. — (Higher education). — ISBN 978-5-534-14388-1. — Text: electronic // EBS Yurayt [website]. — URL: https://urait.ru/bcode/477500 (accessed: 06/20/2021).

b) Additional Readings:_

1. Orlov A. I. Organizatsionno-economicheskoye modelirovanie. Teoria prinyatiya reshenij [Organizational and economic modeling. The decision-making theory]; KnoRus - Moscow, 2011. - 576 p.

2. Petrovsky A. B. Teoria prinyatiya reshenij [The decision-making theory]; Academy - Moscow, 2009. - 400 p.

BiblioRossika An electronic library for students, professors and researchers. http://www.bibliorossica.com/individuals.html?ln=ru
Resources of the Internet information and telecommunication network:

1. Electronic libraries (EL) of RUDN University and other institutions, to which university students have access on the basis of concluded agreements
- RUDN Electronic Library System (RUDN ELS) http://lib.rudn.ru/MegaPro/Web
- EL "University Library Online" http://www.biblioclub.ru

- EL "Yurayt" http://www.biblio-online.ru
- EL "Student Consultant" www.studentlibrary.ru

2. Databases and search engines:
- electronic foundation of legal and normative-technical documentation http://docs.cntd.ru/
- Yandex search engine https://www.yandex.ru/
- Google search engine https://www.google.ru/
- SCOPUS abstract database http://www.elsevierscience.ru/products/scopus/

The following training toolkit for the student's autonomous work is envisaged as part of mastering the discipline/module*:

1. A course of lectures on the *Data Mining and Decision Making* discipline.
2. Laboratory workshop on the *Data Mining and Decision Making* discipline (if laboratory work is available).
3. Methodological guidelines for drafting and formatting the course paper / project on the *Data Mining and Decision Making* discipline (if there are ones).

8. ASSESSMENT TOOLKIT AND GRADING SYSTEM FOR COMPETENCES LEVEL EVALUATION

The assessment materials and the grading system* to evaluate the graduate's level of competences (part of competences) formation as the results of the *Data Mining and Decision Making* discipline are specified in the Appendix to course syllabus.

DEVELOPERS:

Associate Professor of the Applied Economics Department		V.A. Ermakov
Position, educational department	Signature	Name, surname

HEAD OF EDUCATIONAL DEPARTMENT:

Deputy Head of the Applied Economics Department		A.A. Chursin
Name of the educational department	Signature	Name, surname

Program Manager
Associate Professor

of the Applied Economics Department_____   _____   A.A. Ostrovskaya
position, name of the department   signature   Name, surname

Methodological guidelines for students on mastering the discipline (module)

The implementation of the course provides interactive lectures, practical classes (colloquiums) using multimedia equipment, preparation of autonomous creative projects and their subsequent presentations, testing, group discussions on the subject of the course, modern knowledge control technologies.

While studying the discipline, the student must attend a course of lectures, participate in the number of colloquiums provided by the course syllabus, study autonomously some topics of the course and confirm their knowledge during control activities.

The student's work in lectures consists in clarifying the basics of the discipline, briefly taking notes of the material, and clarifying issues that cause difficulties. The lecture notes are the basic educational material along with the textbooks recommended in the main list of readings.

The teaching of the main part of the lecture material involves usage of multimedia tools that facilitate the comprehension and consolidation of the material. Presentations are available for download from the RUDN website and can be freely used by students for educational purposes.

The student must master all the topics provided for by the educational and thematic plan of the discipline. Individual topics and training issues must be mastered autonomously. The student studies the recommended literature, briefly outlines the material, and clarifies the most difficult questions that require clarification during consultations. The same should be done with sections of the course that were skipped due to various circumstances.

For an in-depth study of the issue, the student should study the literature from the additional readings list and specialized websites. It is also recommended that students communicate in professional community forums.

Students study educational, scientific literature and periodicals on an autonomous basis. They have the opportunity to discuss what they have read with the teachers of the discipline during scheduled consultations, with other students at colloquiums, as well as at lectures, asking the professor questions.

The control of autonomous work is carried out by the professor in charge. Depending on the teaching methodology, the following forms of continuous assessment can be used: a short oral or written survey before the start of classes, tests, control papers, written homework, essays, etc.

The assessment toolkit for the midterm assessment of students in the discipline (module) *(developed and issued in accordance with the requirements of the " Regulations for the Formation of Assessment Toolkit (FOS"), approved by the Rector's order No. 420 dated 05.05.2016).*

The code of the controlled competence or its part	Controlled Discipline Section	Controlled Discipline Topic	Classroom work					Autonomous work					Exam/Test	Scores Topics	Section Scores
			Survey	Test	Colloquium	Control Paper	Discussion	Essay	Homework	Report	Creative Project	Course Paper / project			
GC-3, GC-6 PC-1	**Section 1.** Basic Concepts and Tasks Solved by Data Mining Methods	Subject 1. A Brief History and Terminology.					5		5					10	20
		Subject 2. Theoretical Problems Solved by Data Mining Methods	5			5								10	
GC-3, GC-6 PC-1	**Section 2.** Basic Data Mining Models	Subject 3. Knowledge Representation Models							5					5	20
		Subject 4. Lenient Evaluations		10										10	
		Subject 5. Neural Networks	5											5	
GC-3, GC-6 PC-1	**Section 3.** Expert Methods and Expert Systems in Data Mining	Subject 6. Models of Decision-Making Theory: Criteria-Based and Probabilistic Approaches. Expert Methods	10											10	20
		Subject 7. Designing of Intelligent Systems					5		5					10	
		Exam											40		
		TOTAL	15	5		10	5	10	15				40	60	100

Applied Economics Department

Examination Cards

Data Mining and Decision Making

Discipline_____Data Mining and Decision Making_____

(name of the discipline)

EXAMINATION CARD No. 1

1. Stages of the decision-making procedure.
2. Analysis of the elements of the selection task (criteria, alternatives, assessment, choice of solution).
3. The set of relations allowed for easy decision-making

Compiled by _____A.V. Yudin
(signature)

Head of the department _____A.A. Chursin
(signature)

« __ "_____ 2018

Discipline_____Data Mining and Decision Making_____

(name of the discipline)

EXAMINATION CARD No. 2

1. Conversion of ratings by criteria into alternative relations.
2. The approach of a single synthesizing criterion (denying incomparability).
3. A local selection approach through trial and error.

Compiled by _____A.V. Yudin
(signature)

Head of the department _____A.A. Chursin
(signature)

« __ "_____ 2018

Discipline_____Data Mining and Decision Making_____

(name of the discipline)

EXAMINATION CARD No. 3

1. The technique of ordering preferences through proximity to the ideal solution.
2. Simple folds and passive-active compensation analysis between many criteria.
3. The building hierarchies layout.

Compiled by _____A.V. Yudin

(signature)

Head of the department _____A.A. Chursin

(signature)

« __ "_____ 2018

As part of the exam, the level of mastering all the competencies of the discipline can be controlled (depending on the question).

The set of examination cards includes assessment criteria for the discipline developed by the teacher and approved at the meeting of the department.

Criteria for assessing of answers to exam questions:

The answer to each exam is valued from 0 to 10 points:

Answer Assessment Criteria:	Scores		
	The answer does not meet the criteria	The answer partially meets the criteria	The answer fully meets the criteria
The answer is correct	0	1	2
The student answers without suggestive questions from the examiner	0	0.5	1
The student practically does not use the prepared draft	0	0.5	1
The answer demonstrates the student's confident command of the terminological and methodological apparatus of the discipline	0	1	2
The answer has a clear logical structure	0	1	2
The answer demonstrates the student's understanding of the connections between the subject of the question and other sections of	0	1	2

the discipline and/or other disciplines			

This Program has been developed in line with the requirements of the RUDN University Educational Standards.

Developers:

Ph.D., Associate Professor of the Applied Economics Department _____ A.V. Yudin
position, name of the department   signature   Name, surname

_____ _____ _____
position, name of the department   signature   Name, surname

HEAD OF EDUCATIONAL DEPARTMENT:

Deputy Head of the Applied

Economics Department   A.A. Chursin

_____ _____ _____
   Name of the educational department   Signature   Name, surname

Program Manager
Associate Professor

of the Applied Economics Department_____   _____ A.A. Ostrovskaya
position, name of the department   signature   Name, surname