

Syllabus
VK Theory of decision making

Discipline name:	Theory of decision making
Level of higher education:	first (bachelor's degree)
Course page in Moodle:	https://dl2022.khadi-kh.com/course/view.php?id=2654
The scope of the educational component	4 credits (120 hours)
Final control form	Test
Consultations:	on schedule
Name of the department:	department of computer technologies and mechatronics
Language of teaching:	English
Head of the course:	Nikonov Oleg, Doctor of Technical Sciences, professor
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Brief content of the educational component:

The goal is to acquire professional competences, theoretical knowledge and practical skills in the use of decision-making methods and models, examination procedures, formation of expert groups, solving problems in the process of processing expert information and using selection mechanisms.

Subject: methods and means of decision-making and features of their application.

The main tasks of studying the academic discipline are:

- mastering the basic concepts of decision-making theory;
- mastering decision-making methods;
- use of decision-making theory methods to find the optimal solution;
- acquisition of practical skills in the use of methods and tools for decision-making

Competencies acquired by the acquirer:

General competences:

Ability to conduct research at an appropriate level.
Ability to abstract thinking, analysis and synthesis.
Ability to write and speak english languages.

Special (professional) competences:

The ability to solve complex specialized tasks and practical problems in the field of decision-making, characterized by the complexity and uncertainty of conditions for the application of theories and methods of designing, implementing and supporting information systems and technologies.

Learning outcomes:

To have the basic concepts of decision-making theory.
 Have decision-making methods.
 Use the methods of decision-making theory to find the optimal solution.
 Use practical skills of using methods and tools for decision-making.

Thematic plan

№ topics	Name of topics (Lc, Pw, Ss)	Number of hours	
		ocular	extramural
1	Lc Subject, purpose and objectives of the course. Classification of decision-making problems.	2	
	Pw Method of direct assessment of the comparative advantage of alternatives	2	
	Ss Structure of the task and types of decision-making models	11	
2	Lc Axiomatics of rational decision-making.	2	
	Pw Minimax criterion	2	
	Ss Application of preference measurement scales	11	
3	Lc 3 Decision-making heuristics	2	
	Pw The method of constructing the Pareto set	2	
	Ss Method of paired comparisons	11	
4	Lc 4 Alternative analysis methods	2	
	Pw Wald criterion	2	
	Ss Direct assessment method	11	
5	Lc 5 Models and methods of decision making under conditions multicriteria.	2	
	Pw Decision-making methods under conditions multicriteria.	2	
	Ss Pareto and Slater optimality	11	
6	Lc 6 Decision-making under conditions of risk	2	
	Pw Methods of decisions in conditions of risk	2	
	Ss Construction of the utility function	11	
7	Lc 7 Making decisions under conditions of uncertainty and ambiguity	2	
	Pw Decision-making methods under conditions of uncertainty and vagueness	2	
	Ss Vague relations	11	
8	Lc 8 Organization of expert assessment	2	
	Pw Processing and analysis of survey results	2	
	Ss Determination of relative coefficients of expert competence	11	
Total	Lectures	16	
	Practical works	16	
	Self-study	88	

Individual educational and research task (if available): not provided.

Teaching methods:

- 1) verbal: 1.1 traditional: explanation, story, conversation, etc;
 1.2 interactive (non-traditional): problem solving, discussions, etc;
- 2) visual: the method of illustrations, the method of demonstrations;

- 3) practical: 3.1 traditional: practical classes;
 3.2 interactive (non-traditional): business and role-playing games, trainings, discussions, «round table», brainstorming method.

Evaluation system and requirements:

Current performance

1 The current success of applicants for the performance of educational types of work in training sessions and for the performance of independent work tasks is evaluated using a four-point rating scale with subsequent transfer to a 100-point scale. During the evaluation of the current academic performance, all types of work provided by the educational program are taken into account.

1.1 Lecture classes are evaluated by determining the quality of performance of specified tasks.

1.2 Practical classes are evaluated by the quality of performance of a control or individual task, performance and design of practical work.

1.3 Laboratory classes are evaluated by the quality of reports on the performance of laboratory work.

1.4 Seminar classes are evaluated by the quality of individual assignment/abstract.

2 Assessment of the current performance of higher education applicants is carried out at each practical session (laboratory or seminar) on a four-point scale ("5", "4", "3", "2") and is entered in the log of academic performance.

– "excellent": the winner mastered the theoretical material flawlessly, demonstrates deep knowledge of the relevant topic or academic discipline, the main provisions;

– "good": the applicant has mastered the theoretical material well, has the main aspects from primary sources and recommended literature, presents it in a reasoned way; has practical skills, expresses his thoughts on certain problems, but certain inaccuracies and errors are assumed in the logic of the presentation of theoretical content or in the analysis of practical ones;

– "satisfactory": the applicant has basically mastered the theoretical knowledge of the educational topic or discipline, orients himself in primary sources and recommended literature, but answers unconvincingly, confuses concepts, answers additional questions uncertainly, does not have stable knowledge; when answering questions of a practical nature, reveals inaccuracy in knowledge, does not know how to evaluate facts and phenomena, connect them with the future profession;

– "unsatisfactory": the applicant has not mastered the educational material of the topic (discipline), does not know scientific facts, definitions, hardly orients himself in primary sources and recommended literature, lacks scientific thinking, practical skills are not formed.

3 The final score for the current activity is recognized as the arithmetic mean sum of points for each lesson, for individual work, current control works according to the formula:

$$K^{current} = \frac{K1 + K2 + \dots + Kn}{n},$$

where $K^{current}$ – final assessment of success based on the results of current control;

$K1, K2, \dots, Kn$ – performance evaluation n measure of current control;

n – number of ongoing control measures.

Grades are converted into points according to the calculation scale (table 1).

Table 1 – Recalculation of the average grade for the current activity into a multi-point scale

4- point scale	100- point scale	4- point scale	100- point scale	4- point scale	100- point scale	4- point scale	100- point scale
5	100	4,45	89	3,90	78	3,35	67
4,95	99	4,4	88	3,85	77	3,3	66
4,9	98	4,35	87	3,80	76	3,25	65
4,85	97	4,3	86	3,75	75	3,2	64
4,8	96	4,25	85	3,7	74	3,15	63
4,75	95	4,20	84	3,65	73	3,1	62
4,7	94	4,15	83	3,60	72	3,05	61
4,65	93	4,10	82	3,55	71	3	60
4,6	92	4,05	81	3,5	70	from 1,78 to 2,99	from 35 to 59
						reassembly	
4,55	91	4,00	80	3,45	69	from 0 to 1,77	from 0 to 34
4,5	90	3,95	79	3,4	68	repeated study	

Final assessment

1 A student of higher education receives a credit in the last lesson in the discipline based on the results of the current assessment. The average score for the current activity is converted into points on a 100-point scale, according to the conversion table (table 1). Applicants for higher education who have a current grade point average in the discipline lower than "3" (60 points) can increase their current grade by taking tests in the discipline in the last session.

Assessment of knowledge of applicants by means of testing is carried out according to a scale:

- "Excellent": at least 90% of correct answers;
- "Very good": from 82% to 89% of correct answers;
- "Good": from 74% to 81% of correct answers;
- "Satisfactory": from 67% to 73% of correct answers;
- "Satisfactory enough": from 60% to 66% of correct answers;
- "Unsatisfactory": less than 60% of correct answers.

2 The condition for obtaining credit is:

- making up for all missed classes;
- the average current grade in the discipline is not lower than "3" (60 points).

3 For performing individual independent work and participation in scientific events, additional points are awarded to the winners.

3.1 Additional points are added to the sum of points scored by the student of higher education for the current educational activity (for disciplines for which the final form of control is a test) or to the final grade in the discipline for which the final form of control is an exam.

3.2 The number of additional points awarded for different types of individual tasks depends on their volume and importance:

- prizes in the discipline at the international / all-Ukrainian competition of scientific student works - 20 points;
- prize places in the discipline at the All-Ukrainian Olympiads - 20 points;
- participation in the international / all-Ukrainian competition of scientific student works - 15 points
- participation in international / all-Ukrainian scientific conferences of students and young scientists - 12 points;
- participation in all-Ukrainian Olympiads in the discipline - 10 points

- participation in Olympiads and scientific conferences of the Khnadu in the discipline - 5 points;
- performance of individual research (educational and research) tasks of increased complexity - 5 points.

3.3 The number of additional points cannot exceed 20 points.

4 The learning result is evaluated (select is required):

- on a two-point scale (passed/failed) according to table 2;
- on a 100-point scale (for differentiated assessment) according to table 3.

The final grade together with additional points cannot exceed 100 points.

Table 2 – The scale for transferring points to the national evaluation system

On a 100-point scale	On a national scale
from 60 points to 100 points	passed
less than 60 points	fail

Table 3 – The scale for evaluating the knowledge of students based on the results of the final control of the academic discipline

Score in points	Evaluation on a national scale		Evaluation according to the ECTS scale	
	exam	test	Estimation	Criteria
90-100	Excellent	Passed	A	The theoretical content of the course has been mastered in its entirety, without gaps, the necessary practical skills for working with the mastered material have been formed, all educational tasks provided for in the training program have been completed, the quality of their performance has been assessed with a number of points close to the maximum
80-89			B	The theoretical content of the course has been mastered in its entirety, without gaps, the necessary practical skills for working with the mastered material have mainly been formed, all educational tasks provided for by the training program have been completed, the quality of most of them has been assessed with a number of points close to the maximum
75-79			C	The theoretical content of the course has been mastered in its entirety, without gaps, some practical skills of working with the mastered material have not been formed enough, all educational tasks provided for by the training program have been completed, the quality of none of them has been assessed with a minimum number of points, some types of tasks have been completed with errors

Score in points	Evaluation on a national scale		Evaluation according to the ECTS scale	
	exam	test	Estimation	Criteria
67-74	Satisfactorily		D	The theoretical content of the course is partially mastered, but the gaps are not of a significant nature, the necessary practical skills for working with the mastered material are basically formed, most of the educational tasks provided by the training program have been completed, some of the completed tasks may contain errors
60-66			E	The theoretical content of the course has been partially mastered, some practical work skills have not been formed, many educational tasks provided by the training program have not been completed, or the quality of some of them has been evaluated with a number of points close to the minimum.
35-59	Unsatisfactorily	Not passed	FX	The theoretical content of the course has been partially mastered, the necessary practical work skills have not been formed, most of the prescribed training programs of educational tasks have not been completed, or the quality of their implementation has been assessed with a number of points close to the minimum; with additional independent work on the course material, it is possible to improve the quality of the performance of educational tasks (with the possibility of retaking)
0-34	Fail		F	The theoretical content of the course has not been mastered, the necessary practical work skills have not been formed, all completed educational tasks contain gross errors, additional independent work on the course material will not lead to any significant improvement in the quality of the performance of educational tasks (with a mandatory repeat course).

Course policy:

- the course involves working in a team, the environment in the classroom is friendly, creative, open to constructive criticism;
- mastering the discipline involves mandatory attendance of lectures and practical classes, as well as independent work;
- independent work involves the study of individual topics of the academic discipline, which are presented in accordance with the program for independent study, or were considered briefly;
- all tasks provided by the program must be completed within the set time;
- if the student of higher education is absent from classes for a good reason, he presents

the completed tasks during independent preparation and consultation of the teacher;

- the coursework must be protected no later than a week before the beginning of the examination session (indicated if available);
- while studying the course, students of higher education must comply with the rules of academic integrity set forth in the following documents: «Rules of academic integrity of participants in the educational process of the Khnadu» (https://www.khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_67_01_dobroch_1.pdf), «Academic integrity. Checking the text of academic, scientific and qualification papers for plagiarism» (https://www.khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_85_1_01.pdf), «Moral and ethical code of participants in the educational process of the Khnadu» (https://www.khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_67_01_MEK_1.pdf).
- in case of detection of plagiarism, the applicant receives 0 points for the task and must repeat the tasks provided for in the syllabus;
- writing off during tests and exams is prohibited (including using mobile devices). Mobile devices are allowed to be used only during online testing.

Recommended literature:

1. Marchau W.J., Walker W.E., Bloemen T.M. Decision Making under Deep Uncertainty: From Theory to Practice / Springer, 2019, 420p.
2. Kahraman C., Gündoğdu F.K. Decision Making with Spherical Fuzzy Sets: Theory and Applications / 2021, Springer, 561p.
3. Bermúdez J.L. Self-Control, Decision Theory, and Rationality / Cambridge University Press, 2021, 282p.

Additional sources:

1. Distance course:
<https://dl2022.khadi-kh.com/course/view.php?id=2654>

Developer (developers)

the syllabus of the academic discipline _____
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