Foresight methodology in the analysis and modeling of social processes

Foresight Methodology in the Analysis and Modeling of Social Processes
Syllabus of the academic discipline (Syllabus)

Academic discipline requirements	
Level of higher education	**Second (educational and scientific), master's degree**
Discipline	*05 Social and Behavioral Sciences*
Specialty	*054 Sociology*
Educational program	*Social data analytics*
Discipline status	*Regulatory*
Form of study	*Full-time (day)*
Year of training, semester	*First year, spring semester*
Scope of the discipline	*120 hours / 4 ECTS credits* *lectures 18 hours, practical classes 36 hours, independent work 66 hours.*
Semester control/control measures	*Credit/MCR/DCR*
Class schedule	*http://rozklad.kpi.ua*
Language of instruction	*Ukrainian*
Information about the course leader/teachers	Lecturer: *Akimova Olena Andriivna, Candidate of Philosophical Sciences, Associate Professor, Associate Professor of the Department of Theory and Practice of Management* Practical classes: *Tymoshenko Iryna Valeriivna, lecturer at the Department of Theory and Practice of Management*
Course placement	*https://classroom.google.com/c/NjYyMzgzODU0NzMz?cjc=riquu6p*

Academic discipline program

Description of the academic discipline, its purpose, subject of study and learning outcomes

The purpose of the academic discipline:
Formation of knowledge, skills and abilities in higher education students necessary for the use and adaptation of modern foresight methods in the study and modeling of social processes. The discipline is aimed at developing strategic thinking, the ability to forecast, analyze trends and make informed decisions. Special attention is paid to the integration of foresight results into public administration, business planning and socio-economic development.

Subject of the academic discipline:
Modern approaches, tools and methods of foresight , which are used for analysis, forecasting and modeling of social, economic and technological processes. Special attention is paid to studying the

principles of scenario planning, trend analysis, stakeholder involvement and using foresight results for strategic decision-making. Practical aspects of organizing foresight studies, interaction between expert groups, as well as analysis of risks and opportunities for ensuring sustainable development are studied.

Competencies acquired during the study of the discipline:

General competence:

- *GC 06 - Ability to make informed decisions.*

Professional (subject) competencies:

- **FC 01** - *Ability to analyze social phenomena and processes.*
- **FC 02** - *Ability to identify, diagnose and interpret social problems **of Ukrainian society** and the world community.*
- **FC 12** - *Ability to apply modern statistical methods, models, digital technologies, and specialized software for modeling social processes.*

Program learning outcomes:

- **PRN 01** - *Analyze social phenomena and processes using empirical data and modern concepts and theories of sociology.*

- **PRN 02** - *To diagnose and interpret social problems of Ukrainian society and the world community, their causes and consequences.*

- **PRN 03** - *Develop and implement social and interdisciplinary projects, taking into account social, economic, legal, environmental and other aspects of public life.*

- **PRN 13** - *Apply modern, cutting-edge methods of sociological research in the context of digitalization of social relations.*

Prerequisites and post-requisites of the discipline (place in the structural and logical scheme of training according to the relevant educational program)

Prerequisites : to successfully master the discipline, the applicant must master general knowledge and skills relevant to the disciplinary plane in the field of application of scientific research methodology, project management, and critical thinking.

Post-requisites : PO04 Methods of multivariate analysis in sociology, PO07 Programming languages R and Python in statistical computing.

Content of the academic discipline

Topic 1. Introduction to foresight methodology. Overview of key concepts and history

Topic 2. Organizational principles of foresight research

Foresight methodology . Overview of groups of methods

Topic 4. Delphi method in foresight research

Topic 5. Scenario analysis: general concepts and historical aspects

Topic 6. Roadmap Technique in Foresight

Topic 8. Visualization technique "wheels of the future"

Topic 9. Benchmarking best practices in the application of foresight methods in management

Educational materials and resources

Basic literature

1. *Foresight Manual . (n.d.).*
    https://www.undp.org/sites/g/files/zskgke326/files/publications/UNDP_ForesightManual_2018.pdf
2. *United Nations Development Programme . (2022). Foresight playbook : Appendix . Retrieved* from *https://www.undp.org/sites/g/files/zskgke326/files/2022-07/UNDP-RBAP-Foresight-Playbook-Appendix-2022_0.pdf*
3. *United Nations Development Programme. (n.d .). Review of Foresight Practices in the Public Sector: Experiences of the European Parliament, the United Kingdom, Estonia and Finland. Retrieved from https://www.undp.org/uk/ukraine/publications/ohlyad-forsayt-praktyk-u-publichnomu-sektori-dosvid-yevropalarmentu-velykoyi-brytaniyi-estoniyi-ta-finlyandiyi*

Additional literature

4. *United Nations Development Programme . (2022).* Exploring futures : Strategic foresight in action *. Retrieved from https://www.undp.org/sites/g/files/zskgke326/files/migration/ar/PNUDArgent-202203-EN_Explorando-Futuros-final.pdf*
5. *Institute of Risk Management . (n.d.).* Horizon scanning : A practitioner's guide *. Retrieved from https://www.theirm.org/media/7423/horizon-scanning_final2-1.pdf*
6. *Kishita , Y., Uchiyama , Y., Fukushi , K., & Nagasawa , E. (2021).* Foresight and roadmapping methodology : Trends and outlook *. Retrieved from https://www.researchgate.net/profile/Yusuke-Kishita/publication/353167554_Foresight_and_Roadmapping_Methodology_Trends_and_Outlook/links/60eb190d0fbf460db8fd8fe0/Foresight-and-Roadmapping-Methodology-Trends-and-Outlook.pdf*

Additional materials

1. *https://rafaelpopper.wordpress.com/foresight-methods/*
2. *https://www.futures4europe.eu/*
3. *https://www.foresightua.com/?pg=welcome*
4. *https://app.box.com/s/i1g85p829xm1ez0xl0r9mjp2ana2ov9r*
5. *https://www.aurecongroup.com/expertise/digital-engineering-and-advisory/futures-playbook/uncertainty-impact-mapping*
6. *https://www.undp.org/sites/g/files/zskgke326/files/2022-07/UNDP-RBAP-Foresight-Playbook-Appendix-2022_0.pdf*
7. *https://commission.europa.eu/strategy-and-policy/strategic-foresight/2023-strategic-foresight-report_en*

Educational content

Methodology for mastering the academic discipline (educational component)

Lecture classes

No.	Title of the lecture topic and list of main questions *(list of didactic tools, links to information sources)*

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1	***Topic 1. Introduction to foresight methodology. Overview of key concepts and history of development.*** *Key issues: Basic approaches to defining key concepts. History of foresight development : forecasting to strategic planning. Basic principles of foresight methodology. Types of foresight . Areas and tools of application of foresight methodology*
2	***Topic 2 Organizational principles of foresight research*** *foresight organization : stages, participants, resources. Foresight organizational structure : roles and functions of key participants (secretariat, executive committee, thematic groups). Stages of conducting foresight research: from preparation to dissemination of results. Planning, resource management, communication organization. Approaches to choosing methods depending on the focus of the research. Challenges for Ukraine: problems of implementing foresight in conditions of limited resources.*
3	***Foresight methodology . Overview of groups of methods*** *foresight methods : quantitative, qualitative, semi-quantitative , heuristic methods: brainstorming , expert panels; creative methods: scenario planning, roadmapping ; analytical methods: SWOT analysis, weak signal analysis; interactive methods: game simulations, collective seminars; integration methods: modeling, trend maps.* *A brief overview of the main methods: Delphi method . Scenario modeling. SWOT analysis. Trend and roadmap analysis. Actor and stakeholder mapping .*
4	***Topic 4. Horizon scanning and working with trends*** *Signals of change (megatrends , trends, weak signals). Main stages of horizon scanning. Techniques for trend analysis. The concept of "early signal". Application of PEST analysis to determine strategic dimensions of analysis. Foresight radar.*
5	***Topic 5. Delphi method in foresight research*** *Expert evaluation method: overview of basic concepts. Features of expert knowledge. Stages of preparation and conduct of expert evaluation. Possibilities and limitations of the Delphi method .*
6	***Topic 6. Scenario analysis: general concepts and historical aspects*** *The concept of "scenario" in scientific research; types of scenarios. Understanding scenario analysis according to Oliver Sparrow . Overview of examples and areas of application of scenario analysis. Stages of the scenario building process.*
7	***Topic 7. Roadmap Technique in Foresight*** *Features of the application of the road map technique. Types of road maps. Structure of road maps. Comparison of road mapping methods and other foresight methods . Road mapping process: stages and activities.*
8	***Topic 8. "Wheels of the Future" visualization technique*** *A brief history of the methodology. Scope of application. Stages and techniques of application in groups.*
9	***Topic 9. Benchmarking best practices in the application of foresight methods in management*** *Review of foresight practices in the public sector: experience of the European Parliament, Great Britain, Estonia and Finland. Strategic Foresight Report: Sustainable Development and Well-being at the Center of Open Strategic Autonomy of Europe – 2023. Foresight of the Economy of Ukraine.*

Practical classes

No. salary	Title of the lesson topic and list of main questions
1-2	**Practical sessions 1-2: Introduction to foresight methodology** **Questions to consider:** Defining the key components of foresight : how does it differ from other forecasting approaches? Analysis of the basic principles of foresight : which ones are the most important for modern management practices? Examples of successful application of foresight in different countries Consideration of the main functions of foresight and their application in practical activities. Areas of application of foresight : why is it relevant for Ukraine? of foresight tools : how to choose the most effective ones? **Questions for independent study:** Reflect on the topic: "How does foresight help avoid crisis situations in the modern world?" Choose and circle 3 arguments and 3 counterarguments.
3-4	**Practical classes 3-4. Workshop on organizing foresight research** **Tasks:** ● Develop an organizational structure for a foresight project on a given topic (e.g., digital technologies in education). Describe the function of each organizational element. ● Divide the project into main stages (preparation, implementation, dissemination of results). ● Describe the actions required for each stage. Methodology selection: ● Select and justify the methods that are best suited to research a given topic. Resource plan: ● Formation of a plan for the use of resources (human, financial, information). ● Identification of potential sponsors and participants.
5-6	**Practical session No. 5-6. Foresight methodology . Overview of groups of methods** **foresight methods** ● of foresight method depends on the specific task. ● Discussion on the topic "How to conduct scenario modeling?" ● Development of a roadmap for the selected issue: " Digitalization of Education by 2030 (EXAMPLE)". **foresight methods** ● Using SWOT analysis to evaluate strategies in a particular industry. ● Weak signal analysis: identifying trends that can become decisive. Combining methods for comprehensive analysis of the future
7	**Practical lesson 7. Scanning horizons and working with trends** **Application of the "Cross-Influence Analysis" technique** ● Task: Students will identify four key events that could impact a specific area (e.g., education reform, climate policy). Steps: ● Assess the probability of each event separately. ● Determine how one event affects others (probabilistic relationships).

	● *Discuss scenarios and gather arguments.* ● *Result: Create a report with a forecast of possible future scenarios.* *https://www.foresightua.com/?pg=welcome* *https://www.futuresplatform.com/blog/how-to-horizon-scanning-guideline*
8	***Practical lesson 8.*** *Modular test*
9	***Practical lesson 9. Scanning horizons and working with trends*** ***Building a relevance tree*** ● *Task: Students develop a relevance tree for a chosen issue (e.g., achieving sustainable development in a chosen area).* ● *Operationalization of the priority goal into sub-goals and specific actions.* ● *Visualization of ways to achieve the desired result.* ● *Discussion of the result*
10	***Practical lesson 10. Application possibilities and organizational principles of the Delphi method .*** ● *The essence and stages of the Delphi method :* ● *Selecting experts: challenges, requirements, limitations.* ● *Development of questions and features of communication with the expert environment.* ● *Conducting survey rounds.* ● *Summary of results.* ● *Advantages and disadvantages of the Delphi method .* ● *Examples of application in forecasting the development of communities, technologies, and education.*
11-12	***Practical classes 11-12. Workshop on the application of the Delphi method .*** ***Tasks:*** *organize group interaction on choosing a research topic and problem, determining a circle of experts, forming tools, processing and presenting results.*
13	***Practical lesson 13. Roadmap technique in foresight*** *Features of the application of the road map technique. Types of road maps. Structure of road maps. Comparison of road mapping methods and other foresight methods . Road mapping process: stages and features of implementation.*
14	***Practical lesson 14*** *Review and analysis of the Roadmap for the Regulation of Artificial Intelligence in Ukraine (Ministry of Digital Affairs). Work in groups. Defining the structure of the roadmap. Review of its main elements.*
15	***Practical lesson 15*** ***Workshop "The "Wheels of the Future" Technique: Basic Principles of Using the Technique in Group Work"*** ***First*** *stage: Setting the task:* *Choice of issues* *Discussing the problem and clarifying which aspects of the changes will be studied.* *Defining the time frame for changes and capturing the underlying variable (if it has already occurred) in the central circle of the Futures Wheel template.* *Second stage: Analysis of the first level of impact:* *Group work:* *Answer to the question: If the change has already occurred, what will be its immediate consequences?* *Consideration of positive and negative impacts.* *Writing ideas on sticky notes and placing them in the first ring around the main change.* *Third stage: Analysis of the second level of impacts:*

	Group discussion:
	Answer to the question: What consequences and implications arise from the first level of impacts?
	Description of changes caused by first-level impacts.
	Filling the second ring of the template.
	Fourth stage: Analysis of the third level of impacts:
	Group discussions:
	Answer to the question: What new changes can arise from second-level influences?
	Consideration of the positive and negative consequences of changes.
	Completion of the "Wheel of the Future" template.
16-17	***Practical lesson 16-17***
	Benchmarking best practices for the application of foresight methods in management
	Preparation and defense of public speeches on the presentation of best practices (selected by students) in the application of foresight methods
18	***Practical lesson 18***
	Test

Independent work of a higher education student

The master's independent work includes preparation for practical classes by studying the necessary materials, working with recommended literature, and preparing reports based on the results of thematic assignments.

Policy and control

Academic discipline policy (educational component)

Attendance at lectures and practical classes is not assessed, but is recommended, as they cover important theoretical aspects and develop the necessary skills to achieve program outcomes. Assessment is based on the master's activity and completion of practical tasks that contribute to the development of professional skills. Course materials and assignments are available on Google Workspace. Masters have the right to appeal the results of control measures, arguing their position based on assessment criteria or comments within the rights and obligations regulated by the relevant regulatory framework.

Academic Integrity Policy
Regulated by a number of documents:
Code of Honor of the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute". More information: https://kpi.ua/code
The procedure for establishing facts of violation of academic integrity at Igor Sikorsky Kyiv Polytechnic Institute, approved by the Rector's Order No. NU/165/2022 dated September 15, 2022. https://osvita.kpi.ua/node/935
Regulations on the system for preventing academic plagiarism at Igor Sikorsky Kyiv Polytechnic Institute, approved by order No. 1/76 dated February 25, 2020. https://osvita.kpi.ua/node/47
Policy on the use of artificial intelligence for academic activities at Igor Sikorsky Kyiv Polytechnic Institute: https://ela.kpi.ua/server/api/core/bitstreams/70b895b5-1339-4d51-975b-a6114035c950/content

Distance learning
Interaction with higher education applicants takes place via the Zoom platform , Conference links are provided in advance. Google is also available. Meets . Course materials and assignments are hosted in a virtual classroom on the Google platform. Workspace . Practical work and thematic

assignments are completed by applicants independently in remote mode with the possibility of consulting with the teacher.

Inclusive learning

The academic discipline can be taught to most students with special educational needs, except for those individuals who have serious disabilities that prevent them from completing tasks using personal computers, laptops, and/or other technical means.

Learning in a foreign language

A significant part of the educational materials are presented in the original English language, which is due to the requirements for admission to the master's level of HE, which require a sufficient level of proficiency in a foreign language. This allows applicants to fully absorb the educational materials and work with original English-language sources.

Types of control and rating system for assessing learning outcomes (RSO)

Evaluation system

No. salary	Assessment control measure	Gravimetric mark	Ring	Total
1.	*Speeches, participation in discussions and additions to practical classes, completion of cases and practical tasks*	3	18	54
2.	*MKR*	22	1	22
3	*DKR*	24	1	24
	Total			*100*

Current control *: completion of tasks for practical classes*
Calendar control *: carried out twice a semester as a monitoring of the current status of implementation of the syllabus requirements . MCR*

Requirements for DKR
"Preparation of a rapid foresight scenario "
Scoring system (maximum 24 points)
1. **Compliance with the script structure (6 points)**
   o *A clear introduction that defines the purpose of the rapid foresight (2 points)*
   o *Sequence of scenario stages (indicating the main phases: preparation, analysis, scenario construction, results) (3 points)*
   o *Consistency of the scenario with the logic of rapid foresight (1 point)*
2. **Quality of goal and objectives formulation (4 points)**
   o *Clearly formulated goal of conducting rapid foresight (2 points)*
   o *Correspondence of tasks to the goal of the scenario (2 points)*
3. **Methodological validity (10 points)**
   o *foresight methods (e.g. PESTEL, SWOT, expert surveys) (4 points)*
   o *Correspondence of methods to the goals and objectives of the scenario (4 points)*
   o *Innovative approaches in implementation (2 points)*
4. **Design and presentation (4 points)**
   o *Clarity and logical presentation of the material (2 points)*
   o *Compliance with academic requirements (citation, formatting) (1 point)*

        o   *Availability of applications (graphs, tables, visualizations), if required (1 point)*

Task requirements

1. **Scope of work:** *4-6 pages of main text (excluding appendices).*
2. **Work structure:**

        o   *Introduction (goal, objective)*
        o   *Description of the scenario stages*
        o   *Methodological justification*
        o   *Expected results*
        o   *Conclusion*

Evaluation of modular test work.

Modular tests are worth 22 points.

The test task for this paper consists of two questions. Each question is worth 11 points:

– "excellent" – complete answer (at least 90% of the required information) – 10-11 points;

– "good" – a sufficiently complete answer (at least 75% of the required information), or a complete answer with minor inaccuracies – 7-9 points;

– "satisfactory" – incomplete answer (at least 60% of the required information) and minor errors – 4-6 points;

– "unsatisfactory" – the answer does not meet the requirements for "satisfactory" – 0-3 points.

The condition for passing the first calendar control is to obtain at least 15 points. The condition for passing the second calendar control is to obtain at least 30 points.

Students who scored 60 or more points during the semester have the opportunity to:
- receive a passing grade (credit) according to the rating obtained (rating points are converted to a grade according to the table and entered into the semester control record);
- complete a test to increase the grade (in this case, the student's previous rating in the discipline is canceled and he receives a grade only based on the results of the test).

Students who scored less than 60 points during the semester, but met the admission requirements, take a final test.

Assessment of test work:
Answers to the test are evaluated in the amount of 100 points and are awarded for answers to 2 questions:
-complete answer/completed task (at least 90% of the required information) – 50-45 points;
- sufficiently complete answer/task completed (at least 75% of the required information) – 44-38 points;
-incomplete answer/completed task (at least 60% of the required information) – 37-30 points;
-incomplete answer / task not completed (less than 60% of the required information) – 29-0 points.

Table of correspondence of rating points to grades on the university scale:

Number of points	Rating
95-100	*Perfectly*

85-94	*Very good*
75-84	*Good*
65-74	*Satisfactorily*
60-64	*Enough*
Less than 60	*Unsatisfactorily*

Additional information on the discipline (educational component)

Enrollment of certificates of completion of distance or online courses is carried out in accordance with clause 2.2. The Regulation on the recognition of learning outcomes acquired in non-formal/ informal education at Igor Sikorsky Kyiv Polytechnic Institute was approved by order No. 7/177 dated 01.10.2020.

The following certificates within relevant topics can be credited (choose from 6 modules) - https://www.coursera.org/learn/strategic-foresight

The working program of the academic discipline (syllabus):

Compiled *by Associate Professor of the Department of Theory and Practice of Management, Candidate of Philosophical Sciences, Associate Professor Olena Akimova , and Lecturer of the Department of Theory and Practice of Management Iryna Tymoshenko.*
Approved *by the Department of Theory and Practice of Management of the Federal Service for the Promotion of Education (Minutes No. 15 dated 07.06.2024)*
Approved *by the Methodological Commission of the Faculty (Minutes No. 9 dated 06/26/2024)*