Національний технічний університет України
«КИЇВСЬКИЙ ПОЛІТЕХНІЧНИЙ ІНСТИТУТ
імені ІГОРЯ СІКОРСЬКОГО»

Department of Management Theory and Practice FSP

Foresight Methodology in the Analysis and Modeling of Social Processes

Foresight Methodology in the Analysis and Modelling of Social Processes

Curriculum of the academic discipline (Syllabus)

Course details	
Level of higher education	**Second (educational and scientific), Master's degree**
Field of knowledge	*C - social sciences, journalism, information and international relations*
Specialisation	*C5 Sociology*
Educational programme	*Social Data Analytics*
Status of discipline	*Mandatory*
Form of study	*Full-time (day)*
Year of study, semester	*First year, spring semester*
Scope of the discipline	*120 hours / 4 ECTS credits* *16 hours of lectures, 30 hours of practical classes, 74 hours of independent work.*
Semester assessment/assessment measures	*Test/ modular control work*
Class schedule	*https://schedule.kpi.ua/*
Language of instruction	*Ukrainian*
Information about course leader/teachers	Lecturer: *Senior Lecturer in Management Theory and Practice Anna Mykolaivna Ishchenko, a.ishchenko@kpi.ua* Practical classes: *Iryna Tymoshenko, lecturer at the Department of Management Theory and Practice*
Course location	*https://classroom.google.com/c/NjYyMzgzODU0NzMz?cjc=riquu6p*

Curriculum

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

Objective of the course:

To provide higher education students with the knowledge, skills and abilities necessary to use and adapt modern foresight methods in the study and modelling of social processes. The discipline is aimed at developing strategic thinking, the ability to forecast, analyse trends and make informed decisions. Particular attention is paid to the integration of foresight results into public administration, business planning and socio-economic development.

Subject of the discipline:

Modern approaches, tools and methods of foresight used for analysis, forecasting and modelling of social, economic and technological processes. Particular attention is paid to the study of the principles of scenario planning, trend analysis, stakeholder engagement and the use of foresight results for strategic decision-making. The practical aspects of organising foresight studies, interaction between expert groups, and the analysis of risks and opportunities for sustainable development are explored.

Competencies acquired during the study of the discipline:

General competence:

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

Professional (subject) competencies:

- ***PC 01** - Ability to analyse social phenomena and processes.*
- ***PC 02** - Ability to identify, diagnose and interpret social problems **of Ukrainian society** and the global community.*
- ***PC 12** - Ability to apply modern statistical methods, models, digital technologies, and specialised software for modelling social processes.*

Programme learning outcomes:

- ***PRN 01** - Analyse social phenomena and processes using empirical data and modern concepts and theories of sociology.*
- ***PRN 02** - Diagnose and interpret social problems in Ukrainian society and the global 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 the digitalisation of social relations.*

Prerequisites and post-requisites of the discipline (place in the structural-logical scheme of training under the relevant educational programme)

Prerequisites: for successful mastery of the discipline, the applicant must acquire general knowledge and skills relevant to the disciplinary field in the 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.

Course content

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

Topic 2. Organisational foundations of foresight research

Topic 3. Foresight methodology. Overview of groups of methods

Topic 4. The Delphi method in foresight research

Topic 5. Scenario analysis: general concepts and historical aspects

Topic 6. Roadmap technique in foresight

Topic 8. Wheel of the future visualisation technique

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

Training materials and resources

Basic literature

1. *Akimova, O. A. Foresight of the development of Ukraine's defence-industrial complex in the 2021-2030 time horizon. System of asymmetric defence measures for Ukraine. Containing external aggression, ensuring peaceful and sustainable development of the country / O. A. Akimova, V. V. Badrak, A. O. Boldak, K. O. Boyarinova [and 10 others]; National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", World Data Centre for Geoinformatics and Sustainable Development, Institute of Advanced Defence Technologies of Igor Sikorsky Kyiv Polytechnic Institute, Information and Analytical Situation Centre of Igor Sikorsky Kyiv Polytechnic Institute. - Kyiv: Igor Sikorsky Kyiv Polytechnic Institute, 2021. - 148 p.*
   https://discovery.kpi.ua/Record/000640401
2. *Ukrainian Scientific and Technical Foresight: Strategic Priority Areas and Prospects for the Development of Science and Technology / edited by Popovich O.S.; G.M. Dobrov Institute for Scientific and Technical Potential and History of Science of the National Academy of Sciences of Ukraine. - Kyiv: G.M. Dobrov Institute for Research on Scientific and Technical Potential and History of Science of the National Academy of Sciences of Ukraine, 2024. - 84 p.*
   https://discovery.kpi.ua/Record/000646911
3. *Risk Forecasting and Foresight in International Activities: Workshop [Electronic resource]: textbook for full-time master's degree students in International Economics, speciality 051 Economics, field of knowledge 05 Social and Behavioural Sciences / Igor Sikorsky Kyiv Polytechnic Institute; compiled by: Y. I. Hluschenko, O. O. Korogodova, N. O. Chernenko. – Electronic text data (1 file: 934.77 kB). – Kyiv: Igor Sikorsky Kyiv Polytechnic Institute, 2025. – 77 p.*
   https://ela.kpi.ua/handle/123456789/73318
4. *Prokhorova, V. V. Enterprise management in the context of digitalisation based on foresight and innovative technologies [Text]: monograph / V. V. Prokhorova, V. I. Chobitok, I. O. Chobitok; Ukrainian Academy of Engineering and Pedagogy. – Kharkiv: Ivanchenko I. S. Publishing House, 2024. – 147 p. ISBN 978-617-8332-59-4*
   https://irbis-nbuv.gov.ua/cgi-bin/irbis_nbuv/cgiirbis_64.exe
5. *Lozovska L. I., Bandorina L. M., Savchuk L. M., Udačina K. O. Forecasting socio-economic processes: a textbook. Dnipro: UDUNT, 2022.*
   https://crust.ust.edu.ua/bitstream/123456789/15730/1/Lozovska.pdf

Additional reading

6. *Foresight Manual. (n.d.).*
   https://www.undp.org/sites/g/files/zskgke326/files/publications/UNDP_ForesightManual_2018.pdf
7. *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*
8. *United Nations Development Programme. (n.d.). Overview of foresight practices in the public sector: Experience of the European Parliament, Great Britain, Estonia and Finland. Retrieved from https://www.undp.org/uk/ukraine/publications/ohlyad-forsayt-praktyk-u-publichnomu-sektori-dosvid-yevroparlamentu-velykoyi-brytaniyi-estoniyi-ta-finlyandiyi*

9. *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
10. *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
11. *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/i1q85p829xm1ez0xl0r9mjp2ana2ov9r
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)

Lectures

No No	*Lecture topic and list of key issues (list of teaching aids, references to information sources)*
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: from forecasting to strategic planning. Basic principles of foresight methodology. Types of foresight. Areas and tools for applying foresight methodology.*
2	***Topic 2 Organisational principles of foresight research*** *Introduction to the organisation of foresight: stages, participants, resources. Organisational structure of foresight: roles and functions of key participants (secretariat, executive committee, thematic groups). Stages of foresight research: from preparation to dissemination of results. Planning, resource management, communication organisation. Approaches to choosing methods depending on the focus of the research. Challenges for Ukraine: problems of implementing foresight in conditions of limited resources.*
3	***Topic 3. Foresight methodology. Overview of groups of methods*** *Classification of 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: modelling, trend maps. *A brief overview of the main methods: Delphi method. Scenario modelling. SWOT analysis. Trend and roadmap analysis. Mapping of actors and stakeholders.*
4	***Topic 4. Scanning horizons and working with trends*** *Signals of change (megatrends, trends, weak signals). Main stages of scanning the horizon. Trend analysis techniques. The concept of an "early signal." Using PEST analysis to determine strategic dimensions of analysis. Foresight radar.*
5	***Topic 5. The Delphi method in foresight studies*** *Expert assessment method: overview of basic concepts. Features of expert knowledge. Stages of preparing and conducting expert assessments. Possibilities and limitations of the Delphi method.*
6	***Topic 6. Scenario analysis: general concepts and historical aspects*** *The concept of a "scenario" in scientific research; types of scenarios. Understanding scenario analysis according to Oliver Sperrow. 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 applying roadmap techniques. Types of roadmaps. Roadmap structure. Comparison of roadmapping and other foresight methods. The roadmapping process: stages and activities.*
8	***Topic 8. The "wheel of the future" visualisation technique. Benchmarking best practices in the application of foresight methods in management*** *A brief history of the methodology. Scope of application. Stages and techniques of application in groups.* *Overview of foresight practices in the public sector: the experience of the European Parliament, Great Britain, Estonia and Finland. Strategic Foresight Report: sustainable development and well-being at the heart of Europe's Open Strategic Autonomy – 2023. Foresight of Ukraine's economy.*

Practical classes

No. No	*Name of the topic and list of main questions*
1	***Practical classes 1-2: Introduction to foresight methodology*** ***Issues for consideration:*** *Defining the key components of foresight: how does it differ from other forecasting approaches?* *Analysis of the main principles of foresight: which of them are most important for modern management practices?* *Examples of successful foresight application in different countries* *Review of the main functions of foresight and their application in practical activities.* *Areas of application of foresight: why is it relevant for Ukraine?* *Overview of foresight tools: how to choose the most effective ones?* ***Questions for independent study:*** *Consider the topic: "How does foresight help to avoid crisis situations in the modern world?" Select and discuss 3 arguments and 3 counterarguments.*
3-4	***Practical classes 3-4. Workshop on organising foresight studies*** ***Tasks:***

	● *Develop an organisational structure for a foresight project on a given topic (e.g., digital technologies in education). Describe the function of each organisational element.* ● *Divide the project into main stages (preparation, implementation, dissemination of results).* ● *Describe the actions required for each stage.* *Choice of methodology:* ● *Select and justify the methods that are best suited for researching the given topic.* *Resource plan:* ● *Formulate a plan for the use of resources (human, financial, informational).* ● *Identify potential sponsors and participants.*
5-6	***Practical session No. 5-6. Foresight methodology. Overview of groups of methods*** ***Section 1. Overview of basic foresight methods*** ● *Choosing a foresight method depending on the specific task.* ● *Discussion on the topic "How to conduct scenario modelling?"* ● *Developing a roadmap for the selected issue: "Digitalisation of education by 2030 (EXAMPLE)".* ***Section 2. Overview of basic foresight methods*** ● *Using SWOT analysis to evaluate strategies in a specific industry.* ● *Analysis of weak signals: identifying trends that may become decisive.* *Combining methods for a comprehensive analysis of the future*
7	***Practical exercise 7. Scanning horizons and working with trends*** ***Applying the "Cross-Impact Analysis" technique*** ● *Task: Students will identify four key events that could affect a particular 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 control work*
9	***Practical lesson 9. Scanning horizons and working with trends*** ***Building a relevance tree*** ● *Task: Students develop a relevance tree for a selected issue (e.g., achieving sustainable development in a selected area).* ● *Operationalisation of the priority goal into sub-goals and specific actions.* ● *Visualising ways to achieve the desired result.* ● *Discussion of the result*
10	***Practical lesson 10. Possibilities for application and organisational principles of the Delphi method.*** ● *The essence and stages of the Delphi method:* ● *Selection of experts: challenges, requirements, limitations.* ● *Developing questions and features of communication with the expert community.* ● *Conducting survey rounds.* ● *Summarising the results.* ● *Advantages and disadvantages of the Delphi method.*

	• *Examples of application in forecasting the development of communities, technologies, education.*
11	***Practical classes 11. Workshop on the application of the Delphi method.*** ***Objectives:*** *to organise group interaction on selecting a research topic and problem, determining the circle of experts, developing tools, processing and presenting results.*
12	***Practical session 12. Roadmap technique in foresight*** *Features of the roadmap technique. Types of roadmaps. Roadmap structure. Comparison of roadmapping and other foresight methods. Roadmapping process: stages and features.*
13	***Practical session 13*** *Review and analysis of the Roadmap for the Regulation of Artificial Intelligence in Ukraine (Ministry of Digital Transformation). Group work. Determining the structure of the roadmap. Review of its main elements.*
14	***Practical session 14*** ***Workshop "The 'Wheel of the Future' Technique: Basic Principles of Applying the Technique in Group Work"*** *Stage 1: Setting the task:* *Selecting the topic* *Discussing the problem and clarifying which aspects of change will be studied.* *Determining the time frame for change and recording the main variable (if it has already occurred) in the central circle of the Futures Wheel template.* *Stage two: Analysis of the first level of impact:* *Group work:* *Answer the question: If the change has already taken place, what will be its immediate consequences?* *Consider the positive and negative impacts.* *Write down ideas on sticky notes and place them in the first circle around the main change.* *Stage three: Analysis of the second level of impacts:* *Group discussion:* *Answer to the question: What are the consequences and implications of the first level of impacts?* *Describing the changes caused by the first level of impacts.* *Fill in the second ring of the template.* *Stage four: Analysis of the third level of impacts:* *Group discussion:* *Answer to the question: What new changes may arise based on the second level of impacts?* *Consideration of the positive and negative consequences of the changes.* *Completing the "Wheel of the Future" template.*
15	***Practical exercise 15*** ***Benchmarking best practices in the application of foresight methods in management*** *Preparation and defence of public speeches on the presentation of best practices (selected by students) in the application of foresight methods*

Independent work of higher education seekers

Independent work by master's students includes preparation for practical classes by studying the necessary materials, working with recommended literature, and preparing reports on the results of thematic tasks.

Independent work of the applicant includes:
- preparation for classroom sessions – 64 hours;
- preparation for modular control work – 4 hours;
- preparation for tests – 6 hours.
Total – 74 hours.

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 skills necessary to achieve the programme outcomes. Assessment is based on the master's activity and the completion of practical tasks that contribute to the development of professional skills. Course materials and assignments are available in Google Workspace. Master's students 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 Honour of the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute". For more details: https://kpi.ua/code

Procedure for establishing facts of academic integrity violations at Igor Sikorsky Kyiv Polytechnic Institute, approved by Rector's Order No. NU/165/2022 dated 15 September 2022. https://osvita.kpi.ua/node/935

Regulations on the system for preventing academic plagiarism at Igor Sikorsky KPI, approved by Order No. 1/76 dated 25 February 2020. https://osvita.kpi.ua/node/47

Policy on the use of artificial intelligence for academic activities at Igor Sikorsky KPI: 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, with links to conferences provided in advance. Google Meets can also be used. Course materials and assignments are posted in a virtual classroom on the Google Workspace platform. Practical work and thematic assignments are carried out by students independently in a distance learning mode with the possibility of consulting with the teacher.

Inclusive education

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

Foreign language instruction

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

Types of assessment and the learning outcomes assessment rating system (LOAS)

Assessment system

No No	*Assessment measure*	*Weight Points*	*Number*	*Total*
1.	*Presentations, participation in discussions and contributions to practical classes, completion of case studies and practical tasks*	*5*	*14*	*70*
2.	*Modular control work*	*30*	*1*	*30*
	Total			*10*

***Ongoing assessment**: completion of assignments for practical classes*
***Calendar control**: conducted twice per semester as monitoring of the current status of syllabus requirements fulfilment. Modular control work*

Assessment of modular control work.
Modular control work is assessed at 30 points.
The test assignment for this work consists of two questions. Each question is assessed out of 15 points:
– "excellent" – complete answer (at least 90% of the required information) – 14-15 points;
– "good" – sufficiently complete answer (at least 75% of the required information), or complete answer with minor inaccuracies – 11-13 points;
– "satisfactory" – incomplete answer (at least 60% of the required information) and minor errors – 9-10 points;
– "unsatisfactory" – answer does not meet the requirements for "satisfactory" – 0-8 points.

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

Students who have earned 60 or more points during the semester have the opportunity to:
- receive a credit grade (credit) in accordance with the rating obtained (rating points are converted to a grade according to the table and entered into the semester control record);
- take a credit test in order to improve their grade (in this case, the student's previous rating in the discipline is cancelled and they receive a grade based solely on the results of the credit test).

Students who have scored less than 60 points during the semester but have fulfilled the admission requirements take a credit test.

Assessment of the test:
Answers to the test are assessed on a scale 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/completed task (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 between rating points and university scale grades:

Number of points	*Grade*
95-100	*Excellent*
85	*Very good*
75	*Good*
65	*Satisfactory*
60	*Sufficient*
Less than 60	*Unsatisfactory*

Additional information on the discipline (educational component)

Certificates of completion of distance or online courses are credited in accordance with clause 2.2. The Regulations on the recognition by Igor Sikorsky KPI of learning outcomes acquired in non-formal/informal education were approved by Order No. 7/177 dated 01.10.2020.

The following certificates may be accepted within the scope of relevant topics (to be selected from 6 modules) - https://www.coursera.org/learn/strategic-foresight

Work programme for the academic discipline (syllabus):

Compiled by *Anna Mykolaivna Ishchenko, senior lecturer at the Department of Management Theory and Practice, and Iryna Tymoshenko, lecturer at the Department of Management Theory and Practice.*

Approved by *the Department of Theory and Practice of Management of the Faculty of Social Sciences (Minutes No. 15 of 19.06.2025)*

Approved by *the Methodological Commission of the Faculty (Minutes No. 4 of 24 June 2025)*