Ministry of Education and Science of Ukraine
Petro Mohyla Black Sea National University
Economic Sciences Faculty
Land Resources Management Department

"APPROVED":
First Vice-Rector
Yuriy KOTLYAR

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Course Curriculum

Maritime Cadastre

Discipline 2 Professional Training (Specialized Course in English)

Field of Study Geodesy and Land Management

Specialty 193 Geodesy and Land Management / G 18 "Geodesy and Land Management"

Developed by	Lev PEROVYCH	
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Mykolaiv 2025

1. Course Description

Indicator Name	**Course Characteristics**	
Course Name	**Maritime Cadastre.** Course 2 PP (Special course in English)	
Field of Knowledge	**19 Architecture and Construction / G Engineering, Manufacturing and Construction**	
Specialty	**193 Geodesy and Land Management / G 18 "Geodesy and Land Management"**	
Specialization (if any)	-	
Educational Program	Geodesy and Land Management	
Higher Education Level	Third (Educational-Scientific) / **PhD**	
Course Status	Elective	
Year of Study	2	
Academic Year	2025-2026	
Semester Number(s)	**Full-time (Day):** 4	**Part-time (Extramural):** -
Total ECTS Credits/Hours	4 credits / 120 hours	
Course Structure: – Lectures – Seminars (practical, lab) – Independent study hours	**Full-time (Day):** 20 20 80	**Part-time (Extramural):** - - -
Percentage of In-class Work	33%	
Language of Instruction	Ukrainian	
Form of Interim Control	-	
Form of Final Control	Exam	

2. Course Goals, Objectives, and Learning Outcomes

Goal: To develop a system of knowledge regarding the concept of the Maritime Cadastre as a tool for the state accounting of maritime spaces, and to acquire skills in designing cadastral solutions within the territorial sea and the exclusive economic zone (EEZ) of Ukraine.

Objectives:

To study the fundamental concepts and international standards of maritime spatial organization;

To acquire practical skills in working with maritime charts and data to establish the boundaries of maritime parcels;

To foster abilities in creatively seeking ways for the legislative and technical implementation of the maritime cadastre in Ukraine;

To develop proposals for integrating maritime data into the National Spatial Data Infrastructure (NSDI).

Prerequisites: Geodesy, Land Cadastre, Law/Jurisprudence, Fundamentals of GIS.

Expected Learning Outcomes:

Demonstrate an understanding of the structure and functions of maritime management systems;

Exhibit skills in searching for and analyzing hydrographic and legal information to justify management decisions;

Demonstrate skills in identifying territorial conflicts between sea users (e.g., between environmental zones and ports);

Show an ability for flexible thinking when adapting foreign models to Ukrainian legislation.

As a result of studying the discipline, the PhD student

Shall know:

The theoretical place of the Maritime Cadastre within the general system of Ukrainian cadastre;

The international legal regimes of maritime zones according to the UN Convention on the Law of the Sea (UNCLOS);

Principles of forming a maritime coordinate system and the use of vertical datums;

Fundamentals of the S-121 standard (digital description of maritime boundaries).

Shall be able to:

Analyze the maritime environment of Ukraine as an object for future cadastral accounting;

Determine the boundaries of maritime zones and coastal protection strips on digital maps;

Develop the structure (draft) of a maritime cadastral accounting unit, including:

Description of rights for the use of water resources and subsoil;

A list of restrictions in environmental protection and military zones;

Coordinates of maritime infrastructure objects (cables, pipelines);

Proposals for electronic interoperability between water, land, and maritime registries.

Program Competencies

Integral Competence

The ability to produce new ideas and solve complex problems in professional and/or innovative research activities; to utilize the methodology of scientific and pedagogical activity; to conduct independent, original research resulting in theoretical and practical value; to perform scientific and pedagogical activities.

Specialized (Professional) Competencies:

PC1. The ability to critically reflect on problems and strategic directions in professional research activities within the specialty, based on an interdisciplinary approach and in-depth knowledge in the fields of land management, geodesy, and cadastre.

PC2. The ability to apply fundamental knowledge to analyze phenomena of natural and technogenic origin while performing professional tasks in the fields of geodesy, land management, and cadastre.

PC5. The ability to practically apply the theoretical foundations of scientific and pedagogical activity, incorporating the latest achievements and experience of advanced pedagogical technologies in the educational process within professional competence.

Program Learning Outcomes:

PLO 2 Analyzing global experience regarding the functioning of cadastral systems and the information-methodological support of land cadastral activities to determine pathways and possibilities for its adaptation to domestic conditions.

3. Course Syllabus

Full-time Study:

№	Topics	Lectures	Practical Classes (seminars, labs, group work)	Independent Study
1	**Topic 1.** Theoretical and Methodological Foundations of the Maritime Cadastre	2	2	8
2	**Topic 2.** Legal Regime of Maritime Zones and Their Cadastral Registration	2	2	8
3	**Topic 3.** 3D and 4D Modeling in the Maritime Cadastre	2	2	8
4	**Topic 4.** Geodetic and Cartographic Support for the Maritime Cadastre	2	2	8
5	**Topic 5.** Maritime Spatial Data Infrastructure (MSDI)	2	2	8
6	**Topic 6.** Registration of Rights, Restrictions, and Responsibilities (3R)	2	2	8
7	**Topic 7.** Economics of the Maritime Cadastre and the "Blue Economy"	2	2	8
8	**Topic 8.** Integration of Maritime Spatial Planning (MSP) and Cadastre	2	2	8
9	**Topic 9.** Environmental Monitoring and Sustainable Development	2	2	8
10	**Topic 10.** Future Trends: Intelligent Systems and AI in the Maritime Cadastre	2	2	8
	Total for the Course	**20**	**20**	**80**

4. Course Content

4.1. Lecture Plan

Full-time form

No.	Topic / Outline
1	**Topic 1. Theoretical and Methodological Foundations of the Maritime Cadastre** • Evolution of the "Cadastre" concept: from fiscal land systems to multipurpose maritime systems. • Definitions and characteristics of maritime space as an object of cadastral accounting. • Concepts of "Maritime Cadastre" and "Maritime Spatial Planning": interconnections and differences. • Legal framework: The UN Convention on the Law of the Sea (UNCLOS) as the cornerstone. • Challenges of boundary delimitation in a dynamic maritime environment.
2	**Topic 2. Legal Regime of Maritime Zones and Their Cadastral Registration** • Internal waters and the territorial sea: ownership and usage regimes. • Contiguous zone and Exclusive Economic Zone (EEZ): sovereign rights and jurisdiction. • The Continental Shelf: delimitation and registration of rights to subsoil resources. • The International Seabed Area: the common heritage of mankind. • Legal conflicts in transboundary maritime activities and space utilization.
3	**Topic 3. 3D and 4D Modeling in the Maritime Cadastre** • Transition from 2D maps to multidimensional models of maritime space. • Vertical structure of rights: water column, sea surface, seabed, and subsoil. • The temporal dimension (4D) in the maritime cadastre: accounting for tides and seasonal changes. • LADM standards (Land Administration Domain Model) and their adaptation to the maritime environment (ISO 19152). • Visualization of complex objects (underwater pipelines, cables, artificial islands).
4	**Topic 4. Geodetic and Cartographic Support for the Maritime Cadastre** • Coordinate systems and vertical datums at sea. • Remote sensing methods for ocean observation and satellite altimetry. • Hydrographic surveying: utilization of multibeam echosounders and LiDAR. • Accuracy and reliability of geospatial data in the open sea. • Integration of coastal and maritime coordinate systems.
5	**Topic 5. Maritime Spatial Data Infrastructure (MSDI)** • Architecture and components of maritime spatial data infrastructure. • International Hydrographic Organization (IHO) standards, specifically the S-100 universal data model. • Data interoperability between different agencies and states. • The role of metadata in maritime cadastral systems. • Cloud computing and Big Data in maritime data management.
6	**Topic 6. Registration of Rights, Restrictions, and Responsibilities (3R)** • Subjects and objects of maritime legal relations. • Types of rights: resource extraction, laying communication cables, fishing, and nature conservation. • Mechanisms for registering restrictions (e.g., cultural heritage sites, Maritime Protected Areas).

	• Conflict resolution between overlapping types of sea use. • Digital registries and blockchain technology for protecting property rights at sea.
7	**Topic 7. Economics of the Maritime Cadastre and the "Blue Economy"** • Economic valuation of maritime territories and resources. • Cadastral valuation for taxation and leasing of maritime space. • The role of the maritime cadastre in the investment attractiveness of offshore projects. • Ecosystem services as objects of cadastral accounting. • Financial sustainability of national maritime cadastral systems.
8	**Topic 8. Integration of Maritime Spatial Planning (MSP) and Cadastre** • Using cadastral data to develop spatial development plans. • Zoning of maritime areas: industrial, protected, and recreational zones. • Analysis of "user-user" and "user-environment" conflicts. • Decision support systems based on Geographic Information Systems (GIS). • Processes for involving stakeholders in maritime spatial planning.
9	**Topic 9. Environmental Monitoring and Sustainable Development** • Integration of environmental indicators into the maritime cadastre system. • Accounting for Maritime Protected Areas (MPAs) and assessing their effectiveness. • Monitoring anthropogenic pressure on the maritime environment. • Impact of climate change and sea-level rise on cadastral boundaries. • The cadastre as a tool for achieving UN Sustainable Development Goals (SDG 14: Life Below Water).
10	**Topic 10. Future Trends: Intelligent Systems and AI in the Maritime Cadastre** • Automation of data collection using Autonomous Underwater Vehicles (AUVs). • Application of Artificial Intelligence for recognizing patterns of sea use. • The "Digital Twin of the Ocean" concept and its cadastral application. • Cybersecurity of maritime cadastral information systems. • International cooperation towards a Global Maritime Cadastre.

4.2. Plan for Practical (Seminar, Lab, Group) Classes

Full-time form

No.	Topic / Outline
1	**Topic 1. Theoretical and Methodological Foundations of the Maritime Cadastre** **Discussion Questions:** • Can the maritime cadastre be considered a "spatial social contract" between the state and resource users? • Why is the concept of "land under water" as a simple extension of dry land methodologically flawed for the cadastre? **Practical Tasks:** • Formulate your own definition of a "maritime cadastral unit" and justify its difference from a terrestrial land parcel. • Compare two models of cadastre implementation: "top-down" (state initiative) and "bottom-up" (request from private investors) — which is more viable for Ukraine?
2	**Topic 2. Legal Regime of Maritime Zones and Their Registration** **Discussion Questions:** • How does the legal status of the "common heritage of mankind" in *The Area* change the classical understanding of ownership in the cadastre?

	• Is the current version of UNCLOS capable of ensuring the legal stability of cadastral boundaries in the face of hybrid maritime threats? **Practical Tasks:** • Describe the hierarchy of property rights and jurisdiction that arises during the transition from the territorial sea to the high seas. • Substantiate a list of "legal phantoms" — objects that exist in law but cannot be unequivocally reflected in a classical registry (e.g., the right of transit).
3	**Topic 3. 3D and 4D Modeling** **Discussion Questions:** • Is a 3D cadastre a necessity, or is it merely a technological complication that can be avoided through a system of restrictions? • How does the temporal dimension (4D) change the owner's responsibility for an object (e.g., during the seasonal migration of bioresources)? **Practical Tasks:** • Develop a theoretical scheme for the vertical allocation of rights for multi-level sea use (energy + transport + ecology). • Identify conditions under which a 2D description of a maritime object becomes legally insufficient for dispute resolution.
4	**Topic 4. Geodetic and Cartographic Support** **Discussion Questions:** • Is a "coordinate" the sole and sufficient identifier of a maritime object, or must it be tied to physical markers? • The problem of uncertainty: what degree of geodetic error can a state afford when registering rights on the shelf? **Practical Tasks:** • Theoretically justify the choice of a vertical datum for an integrated "coast-sea" cadastre within the Black Sea basin. • Compare the theoretical advantages of satellite versus direct measurements in the context of forming an "evidence base" for the cadastre.
5	**Topic 5. Maritime Spatial Data Infrastructure (MSDI)** **Discussion Questions:** • Who should hold the monopoly on maritime data: the state, the scientific community, or international organizations? • Is the openness of MSDI data a threat to national security during military conflicts? **Practical Tasks:** • Describe the information flow between the "data producer" (e.g., a research vessel) and the "consumer of the right" (the registrar). • Determine the minimum necessary set of characteristics for a maritime object to ensure its "recognizability" by other state registries.
6	**Topic 6. Registration of Rights, Restrictions, and Responsibilities (RRR)** **Discussion Questions:** • Can "responsibility" be an object of trade or transfer within a maritime cadastre? • How can one identify "invisible" restrictions (e.g., acoustic pollution) imposed on a cadastral unit? **Practical Tasks:** • Develop a classification of "user-user" spatial conflicts and propose a theoretical algorithm for their prioritization.

	• Describe the structure of a record for a maritime real estate object (e.g., an artificial island), taking into account the rights and duties of the owner.
7	**Topic 7. Economics of the Maritime Cadastre** **Discussion Questions:** • Is the cadastre a budget expenditure item, or is it capable of generating direct income for the state? • How do you value the cost of "nothing" (empty maritime space) reserved for future needs? **Practical Tasks:** • Justify a system of factors influencing the cadastral value of a maritime area (depth, bioresources, proximity to infrastructure). • Describe the correlation between the availability of cadastral information and interest rates for loans on maritime projects.
8	**Topic 8. Maritime Spatial Planning (MSP)** **Discussion Questions:** • Where does "planning" end and "administration" (cadastre) begin? • Is "democratic" sea planning possible if the main stakeholders are large corporations and the state? **Practical Tasks:** • Development of zoning criteria: Define principles for allocating "priority development zones" at sea that do not violate existing property rights. • Critical analysis of DSS: Describe the logical steps of a Decision Support System when choosing a location for an offshore object.
9	**Topic 9. Environmental Monitoring and Sustainable Development** **Discussion Questions:** • "Green Cadastre": do we have the right to register rights to resources that we are obligated to preserve for future generations? • How should "climate migration" of boundaries be registered in international law? **Practical Tasks:** • Substantiate the role of the cadastre as a tool for monitoring UN Sustainable Development Goal No. 14. • Describe the legal consequences for the owner of a maritime structure in the event of its physical destruction due to coastal erosion.
10	**Topic 10. Future Trends: Smart Systems and AI** **Discussion Questions:** • Is AI capable of being an objective "arbitrator" in resolving maritime spatial disputes? • Does the automation of the cadastre threaten state sovereignty over its territorial waters? **Practical Tasks:** • Describe the concept of an "autonomous cadastre" that updates itself based on data streams without official intervention. • Formulate ethical principles for the use of artificial intelligence in managing shared maritime resources.

5. Independent Study Assignments

5.1. Practical (Analytical) Work

Goal: To develop the PhD student's ability for independent scientific design of maritime cadastre elements at the local level, analysis of legal conflicts between state and municipal water management, and the development of spatial zoning models for coastal territories.

Topic: "Scientific and Methodological Substantiation of Cadastral Zoning for Coastal Territories and Water Areas (Based on a Selected Territorial Community)"

1. Content and Procedure The PhD student independently selects a coastal urban or rural territorial community (e.g., Ochakiv, Chornomorsk, Yuzhne, etc.) and conducts a comprehensive desk study. The work is based on the analysis of public cadastral maps, Ukrainian legislation, and international standards for the geoinformation accounting of maritime spaces.

2. Structure and Formatting Requirements The work is formatted as an independent scientific study with the following parameters:

- **Technical Requirements:** Microsoft Word, Times New Roman font, 14 pt, 1.5 line spacing.
- **Source Base:** At least 5 sources (legal acts of Ukraine, international conventions, ISO 19152 or S-121 standards, contemporary scientific publications).

Mandatory Sections:

- **Introduction:** Justification of relevance (the problem of the "legal vacuum" regarding the maritime territories of communities).
- **Literature Review:** Critical analysis of existing approaches to maritime land management and international standards.
- **Main Body:** Analysis of the selected object through the lens of the control questions (see section 3).
- **Conclusions and Proposals:** Author's recommendations for legislative changes or the structure of the future maritime cadastre.

3. Control Questions In the main body, the PhD student must theoretically solve the following scientific and applied problems:

Legal Status and Boundaries:

- **Delimitation Line:** How is the boundary line between land and sea drawn in your project (along the waterline, the low-water mark, or via fixed coordinates)?
- **Jurisdictional Limits:** Where does the territorial competence of the community end according to the Land and Water Codes of Ukraine—

strictly at the shoreline, or should it include a belt of internal maritime waters?

- **Spatial Extent:** What width of the water area (e.g., a 2-mile zone) is appropriate to assign to the community for administering local fees and infrastructure management?

Cadastral Zoning and Rights (RRR):

- **Functional Zoning:** Which specific maritime zones (recreational, hydraulic structures, military, protected areas) should be reflected in the cadastral plan of the community's water area?
- **Registration of Rights:** How can a community legally secure the right to use the seabed (under improvement objects, piers, marinas) in the absence of a specialized maritime registry?
- **Protection of Interests:** How can the priority of community rights be reflected in the cadastre if the state plans to grant permits for industrial resource extraction in the coastal strip?

Integration and Development:

- **3D/4D Aspects:** How can the intersection of different types of use be reflected in a single cadastral unit (e.g., a municipal pipeline on the bottom and a transport fairway on the surface)?
- **International Adaptation:** Which foreign management model (French, Greek, or another) do you propose as a benchmark for adaptation in the chosen community?

4. Methodological Recommendations (Example: Ochakiv Community)

When performing the work, the student should consider specific encumbrances and characteristics of the object, including:

- Interaction with port infrastructure (state property) and municipal property of the community.
- Restrictions arising from border zone status and military use of waters.
- Environmental requirements due to proximity to Nature Reserve Fund objects (e.g., "Biloberezhia Svitoslava" National Nature Park).

5.2. Individual In-Class Work

Goal: Rapid assessment of the PhD student's ability to apply acquired knowledge in real-time and development of quick situational analysis skills.

Content: Answering the instructor's questions during group sessions, participating in case study resolutions, and express analysis of proposed documents or situations.

Requirements:

- Clarity and conciseness of the response.
- Ability to link theoretical material with the practice of maritime cadastre.
- Demonstration of awareness regarding current changes in the field.

5.3. Testing

- **Goal:** Verification of the level of mastery of theoretical material, identification of gaps in knowledge of the regulatory framework and technical standards.
- **Content:** Working with test assignments of various forms (single or multiple choice). The task scenario describes a specific scientific or practical problem in maritime land management.

5.4. Conference Abstracts

Goal: To develop skills in concise and meaningful presentation of scientific research results, to prepare for the approbation of scientific findings at conferences, and to initiate scientific discussion among specialists.

Content: The PhD student independently selects a topical issue within the course's subject matter, conducts a literature review of sources, and formulates their own scientific propositions.

Requirements:

Volume: 1–3 pages of printed text.

Clear Structure: Problem statement, analysis of recent research, presentation of the main material, and conclusions.

Style: Scientific and argumentative.

Terminological Accuracy and Logical Sequence: Precision in professional language and consistency in thought.

6. Educational Process Support

To ensure high-quality delivery of lecture material and the effective conduct of seminars, classrooms must be equipped with:

Multimedia Projection Equipment: Projector, screen, laptop/computer.

Internet Access: Wi-Fi access point.

Operating Systems: Windows, Android, iOS.

Browsers: Chrome, Opera, Mozilla Firefox, MS Edge.

Software: Word, Excel, PowerPoint; Skype, Zoom, Google Meet.

E-learning System: Moodle 3.9.

Training Classroom: Whiteboard, flipchart, and a creative stationary set (markers, pencils, colored sticky notes, large format paper/Whatman paper, flipchart pads, etc.).

7. Final Control

List of Exam Questions:

1. What is the definition of "Maritime Cadastre" according to Robertson?
2. Why did the need for a maritime cadastre become urgent in the late 1990s?
3. Explain the concept of the "volumetric reality" of a maritime parcel.
4. Which four physical layers are encompassed by a maritime parcel?
5. What is the "fourth dimension" (4D) in a maritime cadastre, and why is it important?
6. How did the United Nations Convention on the Law of the Sea (UNCLOS) influence the development of maritime registries?
7. What are the key differences between cadastral accounting on land versus at sea?
8. What are the primary economic drivers for establishing a maritime cadastre?
9. Explain the term "Maritime Administrative System."
10. Which components of a terrestrial cadastre have direct parallels in the ocean?
11. Describe the three pillars of a maritime cadastre.
12. What does the abbreviation "3R" represent in the context of the legal pillar of a cadastre?
13. Why is a maritime cadastre considered "multipurpose"?
14. How does a maritime cadastre contribute to "Blue Growth"?
15. Explain the importance of "legal certainty" for investments in offshore energy.
16. What is a "baseline," and how is it determined?
17. What is the legal status of internal maritime waters?
18. Describe the boundaries and state rights within the Territorial Sea.
19. What is the "right of innocent passage," and how is it reflected in the cadastre?
20. What functions does the Contiguous Zone perform?
21. What is the maximum width of the Exclusive Economic Zone (EEZ)?
22. What sovereign rights does a state hold in the EEZ according to UNCLOS?
23. How do state rights regarding the Continental Shelf differ from those in the EEZ?
24. What is "The Area," and who owns its resources?
25. Explain the concept of the "High Seas" in the context of jurisdiction.
26. Which zones beyond the 12-mile limit are subject to national cadastral accounting?
27. How are the rights of other states to lay cables in the EEZ accounted for in the cadastre?
28. What is an "ambulatory boundary," and what problems does it create for the cadastre?
29. How are rights differentiated between living and non-living maritime resources?
30. What is the role of the International Seabed Authority (ISA) in resource regulation?
31. What is Maritime Spatial Data Infrastructure (MSDI)?

32. What is the role of the maritime cadastre within the MSDI structure?
33. Explain the "collect once — use many times" principle.
34. What types of data are typically contained within the "Human Activities" layer?
35. What is the INSPIRE Directive, and how does it relate to maritime data?
36. Describe the significance of bathymetry for a maritime cadastral plan.
37. What difficulties exist in the physical demarcation of maritime boundaries?
38. How does 3D modeling help visualize overlapping rights in the water column?
39. Which ISO standards are used to describe maritime spatial data?
40. What is data interoperability, and why is it critical for transboundary projects?
41. How are mobile objects (e.g., floating platforms) represented in the cadastre?
42. What role does satellite monitoring play in maintaining a maritime cadastre?
43. How does the accuracy of terrestrial geodesy differ from maritime navigational cartography?
44. How are underwater cultural heritage sites (sunken ships) recorded in a maritime cadastre?
45. Explain the concept of "Seamless SDI."
46. Define the concept of Maritime Spatial Planning (MSP).
47. What is the purpose of EU Directive 2014/89/EU?
48. Why is the cadastre considered the foundation for effective MSP?
49. How does MSP help resolve conflicts between fisheries and wind energy?
50. What is Integrated Coastal Zone Management (ICZM)?
51. How are environmental restrictions (Natura 2000 zones) incorporated into a maritime cadastre?
52. Describe the decision-making process in maritime spatial planning.
53. Which sectors of the "Blue Economy" are priorities for the EU?
54. How does a maritime cadastre contribute to maritime safety?
55. What are "bottlenecks" in maritime spatial management?
56. Explain the role of stakeholders in the process of water area zoning.
57. How does a cadastre assist in managing offshore oil and gas extraction?
58. Describe the importance of recording military zones in a public maritime cadastre.
59. How do climate changes (sea-level rise) affect maritime planning?
60. What is "transboundary cooperation" in the context of MSP?
61. What is the EU "Blue Book," and what are its main provisions?
62. Describe the activities of the EMODnet network.
63. What eight thematic portals exist within the EMODnet structure?
64. What role does the Copernicus Maritime Service (CMEMS) play in maritime research?
65. What is the European Atlas of the Seas, and who supports it?
66. Why can data from the Atlas of the Seas not be used as official legal advice?
67. What are the INSPIRE Directive requirements regarding "Sea Regions"?

68. How does the EU support aquaculture development through spatial data?
69. What is "Maritime Knowledge 2020," and what is the goal of this initiative?
70. How does data sharing affect the EU economy?
71. What are the functions of the European Maritime Safety Agency (EMSA)?
72. Describe the significance of the "Common Information Sharing Environment" (CISE).
73. How does European maritime policy account for the interests of outermost regions?
74. What is the "Green Paper" regarding EU maritime policy?
75. How are projects for developing maritime cadastral prototypes funded in the EU?
76. Describe the AMSIS system in Australia.
77. What are the specific features of the U.S. Maritime Cadastre?
78. What accounts for the success of the Israeli maritime cadastre model?
79. How does Canada implement maritime cadastre, using the COINAtlantic project as an example?
80. What is the status of the maritime cadastre in Denmark (role of structure registration)?
81. Describe the Estonian "Maritime Areas" application and its link to the Land Board portal.
82. How is maritime data management organized in Germany?
83. Why does France have one of the largest EEZs in the world, and how does it administer it?
84. What role does SHOM play in France regarding maritime cartography?
85. Describe the status of maritime cadastre development in Greece.
86. How does Italy use the SID system for coastal management?
87. What is notable about the Netherlands' experience in North Sea planning?
88. What are the features of maritime spatial management in the United Kingdom?
89. How does Sweden differentiate between "public" and "private" water?
90. Describe the progress of creating a maritime cadastre in Croatia.
91. Which EU countries have integrated maritime registration into a nationwide system?
92. Why do many EU countries have "descriptive" systems instead of full cadastres?
93. What is the role of national hydrographic services in creating a cadastre?
94. How is access to maritime data organized in Belgium?
95. Describe the role of the "Survey of Israel" in defining maritime blocks.
96. What is the difference between a "deeds system" and a "title system" at sea?
97. What types of rights can exist on the seabed?
98. What are the "patrimonial rights" of a state in a water area?
99. How are licenses for resource extraction registered?
100. Can a private individual own a portion of a water area in Europe?

101. What are "restrictions," and how are they recorded in the cadastre?
102. Describe the concept of "responsibility" for the owner of a maritime structure.
103. How is the right to fish represented in a maritime cadastre?
104. What are the specific features of registering underwater pipelines and cables?
105. What is a "maritime mortgage," and how is it linked to the cadastre?
106. How are disputes resolved when multiple rights overlap on a single site?
107. Why is the registration of rights at sea a dynamic process?
108. What data is necessary to ensure the "financial security" of offshore projects?
109. Explain the difference between public and private rights in the Territorial Sea.
110. How are artificial islands and installations registered according to UNCLOS?
111. Why is the land cadastre only a partial analogy for the maritime cadastre?
112. What are the main gaps in existing European legislation regarding the maritime cadastre?
113. What steps are necessary to create a "Unified European Maritime Cadastre"?
114. How can blockchain technology be utilized in maritime registries?
115. Explain the importance of "authoritative data" for business.
116. What role will 4D cadastre play in the future for ecosystem monitoring?
117. How can a maritime cadastre help in the fight against Illegal, Unreported, and Unregulated (IUU) fishing?
118. Describe the vision of the "Blue Print" for the future maritime registry.
119. How is the specialty of surveyor/land manager transforming for work at sea?
120. What impact will the creation of a maritime cadastre have on state tax revenues?

Standard Examination Ticket

Petro Mohyla Black Sea National University

(Full name of the Higher Educational Institution)

Higher Education Level: Third (Educational-Scientific) Level, PhD

Specialty: 193 Geodesy and Land Management / G 18 "Geodesy and Land Management"

Semester: IV

Academic Discipline: MARITIME CADASTRE

EXAMINATION TICKET № 0

1. Explain the difference between public and private rights in the territorial sea.
2. What are "restrictions," and how are they recorded in the cadastre?
3. How does European maritime policy account for the interests of remote regions?
4. How is the right to fishing represented in the maritime cadastre?

Approved

Minutes No. ____ dated "_" _____ ***20***

Head of the Department of Management _____ / _____

(Signature) / (Surname and Initials)

Examiner _____ / _____

(Signature) / (Surname and Initials)

Assessment Procedures

Final Control of Knowledge. The result of studying this discipline is an Exam. The prerequisite for admission to the final control is achieving positive grades in current assessments. Student performance is evaluated on a 100-point scale.

The maximum number of points a student can earn during the semester is 60 points.

The maximum number of points for the exam is 40 points.

The examination ticket consists of four theoretical questions; a student receives 10 points for each correct answer.

8. Teaching Methods

The primary forms of instruction include group and individual sessions aimed at mastering a system of professional competencies, practical skills, and abilities within the discipline. The learning process is focused on integrating theoretical knowledge with practical training and involves conducting research in the fields of land management, cadastre, and spatial planning.

To achieve the program learning outcomes, the following methods are utilized:

Explanatory-Illustrative Method: Used to convey systematized information, during which PhD students perceive, comprehend, and structure scientific facts, concepts, and conclusions.

Problem-Based Instruction: The instructor formulates a cognitive task and poses a scientific problem, demonstrating the logic for its resolution. PhD students are involved in the process as co-authors of scientific inquiry, analyzing ways to overcome contradictions in the subject area.

Research Method: A priority for the PhD level; involves independent analysis of the source base, setting original scientific tasks, performing experimental calculations, and validating the results obtained.

Discussion Methods: Aimed at developing critical thinking through the confrontation of positions, reasoned defense of one's own viewpoint, and the constructive resolution of scientific contradictions.

Practical Method: Implemented through case studies, modeling of industrial and scientific situations, completing individual project tasks, and undergoing test control.

Verbal Methods: Scientific explanations, commentaries, consultations, and discussions that contribute to the formation of the researcher's professional terminological apparatus.

9. Assessment Criteria and Diagnostic Tools for Learning Outcomes

Full-time form of study:

No.	Type of Activity (Assignment)	Maximum Points
1	Conference Abstracts	15
2	Testing	10
3	Practical (Analytical) Work	20
4	Individual In-class Work	15 (3 points * 5)
5	Exam	40
	Total	**100**

As part of **non-formal education**, students have the opportunity to complete relevant online training courses (e.g., Prometheus, etc.) instead of performing certain seminar tasks. Points are awarded upon the presentation of corresponding certificates (no more than 3 per semester).

The objects of assessment for student academic achievement are knowledge, skills, abilities, creative experience, and an emotional-value-based attitude toward surrounding reality.

Continuous assessment of student knowledge during a single semester includes evaluations of work in seminar sessions and independent study.

Conference Abstracts (max. 15 points)

Points	Assessment Criteria
13–15	The work demonstrates a high scientific level, contains original author's conclusions, and is clearly structured. Modern sources are utilized. Formatting requirements are fully met.
10–12	The abstracts reveal the essence of the problem and contain elements of analysis, but the conclusions are primarily of a generalized nature. Minor errors in bibliographic formatting are present.
7–9	An abstract-style presentation of material without sufficient independent argumentation. Only basic literature is used. The logic of presentation or structure is compromised.
1–6	The abstracts have low scientific value, contain a significant amount of borrowed material without proper citation, or do not correspond to the subject of the discipline.
0	The work was not submitted or plagiarism was detected.

Testing (max. 10 points)

Points	Percentage of Correct Answers	Level of Preparation and Characteristics
10 points	95 – 100%	Excellent: Full mastery of the material, understanding of UNCLOS nuances and technical standards.
9 points	90 – 94%	Excellent: Systematic knowledge, isolated inaccuracies that do not affect overall understanding.
8 points	83 – 89%	Very Good: Confident knowledge of core concepts (3R, 4D, MSP), minor errors in details.
7 points	75 – 82%	Good: Generally correct understanding of the maritime cadastre structure and the experience of EU countries.
6 points	67 – 74%	Satisfactory: Material mastered at a sufficient level, but there are gaps in complex issues.

5 points	60 – 66%	Sufficient: Knowledge of key terms is present, but analytical connections are difficult to establish.
3–4 points	40 – 59%	Unsatisfactory: Material mastered fragmentarily. Orientation in maritime zones and rights is weak.
1–2 points	25 – 39%	Unsatisfactory: Understanding of basic terms only. Significant number of errors in fundamental questions.
0 points	Less than 25%	Unsatisfactory: Material not mastered. Lack of understanding of the subject.

Practical (Analytical) Work

Total Points (0–20)	Assessment Criterion
19 – 20	Expert: The work demonstrates deep critical analysis, flawless command of terminology, and proposes innovative ways to solve maritime cadastre problems.
17 – 18	Advanced: Thorough analytics with clear logic. The PhD student freely operates with UNCLOS norms and conducts high-quality comparisons of international models.
15 – 16	Very Good: The work is performed at a high level, the argumentation is convincing, but there are minor gaps in technical details or formatting.
13 – 14	Good: The material is mastered well, the analysis is logical, but the work is more descriptive than critical-research oriented.
11 – 12	Satisfactory: Basic requirements are met, terminology is used correctly, but the analysis is superficial, and the author's own conclusions are minimal.
9 – 10	Sufficient: Minimum threshold for passing. The work contains fragmentary analysis and a significant amount of borrowing without proper reflection.
5 – 8	Unsatisfactory: The work requires significant revision. Analysis is replaced by simple narration; there are errors in the legal definition of maritime zones.
0 – 4	Fail: Complete non-compliance with PhD-level requirements. Lack of structure, logic, and understanding of the basic principles of maritime cadastre.

Individual In-Class Work

Points	Assessment Criteria
5	Fluent command of the material; the presentation is reasoned and based on scientific facts. Capable of engaging in polemics, answering complex questions from colleagues, and initiating discussion.
4	Explains the content of the question sufficiently, uses professional terminology, but argumentation lacks references to specific international standards or case studies.
3	Generally possesses knowledge of the topic and expresses correct points, but the presentation is reproductive (retelling literature without independent analysis); minor inaccuracies are present.
2	Does not fully master the issue; answers are fragmentary; unable to support a discussion or provide counterarguments.
1	Partial comments on the topic; mastery of only separate terms without understanding systemic connections.
0	Absence from class or total lack of preparation for discussion.

The assessment of the PhD student's knowledge during the exam is carried out on a **40-point scale** adopted by Petro Mohyla Black Sea National University (PMBSNU).

35–40 points are awarded if the PhD student provided thorough answers to all questions in the ticket. The response demonstrates that the student has a fluent command of all course material provided by the syllabus, possessing comprehensive rather than fragmented knowledge. The student can argue their answer, provide necessary evidence and examples, and analyze proposed situations by referencing information sources. The student understands the significance of the acquired knowledge for future professional activity, confirming this with specific examples. The highest grade is also awarded for the ability to present opposing approaches to evaluating certain phenomena, comparing different scientific positions, and engaging in polemics with researchers. The student must demonstrate creative thinking rather than simple reproduction of facts.

28–34 points are awarded if the PhD student presents an answer to each question logically, revealing the main content. However, the responses lack thoroughness and comprehensiveness; some important nuances are omitted. Minor errors are made in the selection and presentation of facts and examples. At the same time, the student does not fully grasp the relevance of the issues highlighted. Certain inaccuracies occur in the expression of personal opinions. Conclusions do not provide a complete and logical summary.

21–27 points are awarded if the PhD student has not fully disclosed the questions in the ticket or failed to answer one of them, indicating a lack of comprehensive mastery of the course material (knowledge is limited to specific topics, lacks depth, or the logic of presentation is disrupted). The student is unable to analyze the material and does not understand the current relevance of the problem. Argumentation is weak and selective, and significant errors occur in the use of factual material. Conclusions do not reflect the essence of the question or are absent.

Up to 20 points are awarded when each question is disclosed superficially or not at all. Significant errors are made during the presentation; the student does not know or confuses factual material, is unable to analyze core problems, and does not demonstrate creative mental activity. Personal opinions and conclusions are absent.

The final result is recorded as **"Excellent"** (90–100 total points), **"Good"** (75–89 total points), **"Satisfactory"** (60–74 total points), or **"Unsatisfactory"** (below 60 total points).

Grading Scale: National and ECTS

Total Points for All Activities	ECTS Grade	National Scale Grade (Exam, Project, Practice)	P/F Scale (Final Modular Control, Credit, Attestation)
90 – 100	A	Excellent	Pass
82 – 89	B	Very Good	Pass
75 – 81	C	Good	Pass

67 – 74	D	Satisfactory	Pass
60 – 66	E	Sufficient	Pass
35 – 59	FX	Unsatisfactory (with possibility of re-examination)	Fail
1 – 34	F	Unsatisfactory (with mandatory repeat of the course)	Fail

10. Recommended Information Resources

1. Abramic, A., Norton, D., Sarretta, A., Menegon, S., Katsika, M., Gekas, V., Rybka, K., Fernández-Palacios, Y. 2023. Maritime Spatial Planning Data Framework (MSPdF). How to structure input data for MSP process, monitoring & evaluation. Produced by Technical Expert Group (TEG) on Data for MSP. Supported by CINEA and DG MARE (EC). 45p. Doi: 10.2926/440667.
2. Barbara Goličnik Marušić and Andrej Gulič, 2025. The Process and Procedures for the Preparation of Integrated Maritime Spatial Planning: The Case of Slovenia. Ocean and Society.Volume 2. https://doi.org/10.17645/oas.10452A
3. Barianaki, E.; Kyvelou, S.S.; Ierapetritis, D.G. How to Incorporate Cultural Values and Heritage in Maritime Spatial Planning: A Systematic Review. Heritage 2024, 7, 380–411. https://doi.org/10.3390/ heritage7010019.
4. European Commission (2002), RECOMMENDATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL concerning the implementation of Integrated Coastal Zone Management in Europe, Brussels 6.6.2002, 2002/413/EC, Available at http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2002:148:0024:0027:EN:PDF
5. European Commission (2005), STRATEGIC OBJECTIVES 2005 – 2009, Europe 2010: A Partnership for European Renewal Prosperity, Solidarity and Security, Brussels, 26.1.2005, COM(2005) 12 final
6. European Commission (2006), Green Paper on A Future Maritime Policy for the Union: a European Vision of the Oceans and Seas, COM (2006) 275. Available at http://europa.eu/documents/comm/green_papers/pdf/com_2006_0275_en_part2.pdf
7. European Commission (2007a), Conclusions from the Consultation on a European Maritime Policy, Brussels, 10.10.2007, COM (2007) 574 FINAL European Economic and Social Committee, (2007), Opinion of the European Economic and Social Committee on the Communication from the Commission "Towards a future Maritime Policy for the Union: A European Vision for the oceans and seas", 2007/C168/11, Official Journal of the European Union, 20.7.2007 Federal Geographic Data Committee (US) Coordination Group (2010),
8. Francisco Javier Córdoba-Donado, Vicente Negro-Valdecantos, Gregorio Gómez-Pina, Juan José Muñoz-Pérez, Luis Moreno-Blasco.Marine Spatial Planning (MSP) andTerrestrial Spatial Planning (TSP). thePath Towards an Integration of BothPlans. Preprints.org. doi: 10.20944/preprints202503.1692.v1
9. Land Code of Ukraine: Commentary. – Kharkiv: Odissey LLC, 2002. – 600 p.
10. Law of Ukraine. On the Contiguous Zone of Ukraine (Bulletin of the Verkhovna Rada (VVR), 2019, No. 3, Art. 20).

11. Law of Ukraine. On the Exclusive (Marine) Economic Zone of Ukraine (Bulletin of the Verkhovna Rada of Ukraine (VVR), 1995, No. 21, Art. 152).
12. Maritime Doctrine of Ukraine for the period until 2035. Resolution of the Cabinet of Ministers of Ukraine dated October 7, 2009, No. 1307.
13. MSPglobal: international guide on marine/maritime spatial planning, volume 2 : Biodiversity Inclusive Principle, 2025. https://unesdoc.unesco.org/ark:/48223/pf0000395354.
14. Oceanographic Atlas of the Black Sea and the Sea of Azov No. 601, Ukrmorkartohrafiia, 352 p.
15. Papageorgiou, M.; Pozoukidou, G.; Istoriou, T.; Kostopoulou, T. Inclusive Maritime Spatial Planning: Stakes at the Regional Level. Sustainability 2024, 16, 10148. https://doi.org/10.3390/su162210148.
16. Perovych L., Belinska S. Marine Cadastre: Ukrainian Realities in the Context of Global Experience. Collection of Scientific Papers "Modern Achievements of Geodetic Science and Production." Issue I (47), 2024, pp. 203-214.
17. Water Code of Ukraine with amendments introduced by the Law of Ukraine: as of September 21, 2000, No. 1990 – III / Verkhovna Rada of Ukraine – Off. ed. – K.: Parliamentary Publishing House, 2000. – 30 p. – (Library of Official Publications).