

UNIVERSITY OF ECONOMICS - VARNA
FACULTY OF MANAGEMENT
DEPARTMENT OF INTERNATIONAL ECONOMIC RELATIONS

Adopted by the FC (record № 12/ 29.04.2024)

Adopted by the DC (record № 8/ 16.04.2024)

ACCEPTED BY:

Dean:

(Assoc. Prof. Dr. D. Dobrev)

SYLLABUS

SUBJECT: TERMINAL OPERATIONS AND SEAPORT OPTIMISATION

DEGREE PROGRAMME: Maritime Business and International Trade

BACHELOR'S DEGREE

YEAR OF STUDY: 4; SEMESTER: 7

TOTAL STUDENT WORKLOAD: 240 hours; incl. curricular 60 hours

CREDITS: 8

DISTRIBUTION OF STUDENT WORKLOAD ACCORDING TO THE CURRICULUM

<i>TYPE OF STUDY HOURS</i>	WORKLOAD, hours	TEACHING HOURS PER WEEK, hours
CURRICULAR: incl.		
● LECTURES	30	2
● SEMINARS / LAB. EXERCISES	30	2
EXTRACURRICULAR	180	-

Prepared by:

1.....
(Assoc. Prof. Dr R. Miryanov)

2.....
(Prof. Dr. V. Dimitrova)

Head of department
of International Economic Relations:
(Prof. Dr. V. Dimitrova)

I. ANNOTATION

Maritime transport and two of its main components, terminal operations and port activities, are extremely topical and have been the subject of extensive research over the years. This course formulates and proposes a variety of options for optimizing certain activities and processes in seaports. A system of mathematical and economic models and methods are developed, modified and adapted to achieve the optimization in question. The selection of models and methods for optimization of port activities and processes is itself a serious challenge, since the main requirement for them concerns their real practical applicability. The optimization models under consideration incorporate a number of random factors under the influence of which activities and processes take place in seaports, specific quantitative results related to terminal operations are derived as well. Theoretical and methodological aspects of risk are also developed in a specific way, outlining the possibilities for their rational use. Upon completion of the course, students will have the competence to optimize key activities in seaports and apply what they have learned directly into real practical situations.

Key competences developed throughout the course: numerical, scientific and engineering skills and active citizenship.

II. THEMATIC CONTENT

№	TITLE OF UNIT AND SUBTOPICS	NUMBER OF HOURS		
		L	S	L.E.
1. Introduction to seaport activities		2	2	
1.1.	Terminal operations			
1.2.	Operation of vessels			
1.3.	Cargo handling			
1.4.	Other port-related activities			
2. Seaports as a centre of logistic services		2	2	
2.1.	Port infrastructure and equipment			
2.2.	Key stakeholders in seaport management			
2.3.	Overview of seaport logistics			
3. Risk and uncertainty in port activities		4	4	
3.1.	Decision making and uncertainty			
3.2.	Port security and risk management			
3.3.	Applications of probability theory in ports			
4. Basics and types of optimisation		4	4	
4.1.	Introduction to optimising a function			
4.2.	Domain and range			
4.3.	Types of optimal values			
5. Using derivatives for seaport optimisation		4	4	
5.1.	Definition of derivative of a function			
5.2.	First and second derivatives			
5.3.	Application of derivatives			
6. Linear optimisation in seaports		4	4	
6.1.	Linear functions, describing port activities			
6.2.	Simplex method			
7. Transportation problem and its applications in seaports		4	4	
7.1.	Transportation model, describing seaports			
7.2.	Solving transportation problems			
8. Optimisation of terminal operations		2	2	
8.1.	Types of terminal operations			

8.2.	Models for optimising terminal operations			
9. Computer platforms for optimisation		2	2	
9.1.	Online platforms for optimisation			
9.2.	Offline tools for optimising functions			
9.3.	Comparison between all types of optimisation			
10. Application of Markov Chains in seaport operations		2	2	
10.1.	Stochastic processes and Markov Chains			
10.2	Application of Markov chains in seaport activities			
10.3	Markov chains, concerning terminal operations			
Total:		30	30	

III. FORMS OF CONTROL:

№	TYPE AND FORM OF CONTROL	Number	extracurricular, hours
1.	Midterm control		
1.1.	Test #1	1	30
1.2.	Test #2	1	30
1.3.	Course Project	1	20
Total midterm control:		3	80
2.	Final term control		
2.1.	Examination	1	100
Total final term control:		1	100
Total for all types of control:		4	180

IV. LITERATURE

REQUIRED (BASIC) LITERATURE:

1. Song, D.W. and Panayides, P. (2021) Maritime logistics: a guide to contemporary shipping and port management, 3rd edition, Kogan Page.
2. Namboothiri, R. (2012) Drayage Operations at Seaports: A mathematical optimization framework, AV Akademikerverlag.

RECOMMENDED (ADDITIONAL) LITERATURE:

1. Banye, C. (2020) Concession and seaport performance: Measuring seaport performance after concession, LAP LAMBERT Academic Publishing.
2. Christopher, K. (2014) Port Security Management, CRC Press; 2nd edition.