

STUDY SUBJECT DESCRIPTION

1. Information about Program

Name of institution	CONSTANTA MARITIME UNIVERSITY
Faculty	Marine Electromechanical Engineering
Department	Mechanical and Environmental Engineering Studies
Field of stud	Marine Engineering and Navigation
Level of study	PhD
Study program /qualification	Marine Electromechanical Engineering/ PhD in Mechanical Engineering

2. Information about Study Subject

Name of study subject	Special Problems of Fluid and Structures Dynamics				
Name of lector of study course	Prof. Nicolae Buzbuchi				
Name of lector of seminar (workshop)	Prof. Nicolae Buzbuchi				
Year of study	I	Semester	1	Evaluation type	Examination
Category of subject	from educational point of view the subject is: DF - Fundamental , DD - in the field of study, DS - specialization, DC - complementary				DF
	from requirement point of view is the subject is: DO - Compulsory , DA - optional (by choice), DL - free of requirement				DO

3. Total Estimated Time (hours of teaching activities)

I a) Number of hours per week	9	Course	3	Seminars	-	Laboratory	3	Project	-
I b) Total hours per semester	84	Course	42	Seminars	-	Laboratory	42	Project	-

II Time for individual study per semester:	ore
II a) Studies from textbooks, course books, bibliography și notes	50
II b) Studies in library, specialized electronic platforms and experiments	50
II c) Workshop/laboratory preparation, homework, report papers and essay	10
II d) Tutorial studies	10
III Examination	4
IV Other activities (to be added):	-

Total hours of individual studies II (a+b+c+d)	120
Total hours per semestru (Ib+II+III+IV)	208
Number of credits	15

4. Prior knowledge required (if needed)

Curriculum	Hydraulics
Competency	Mechanics, Thermodynamics

5. Conditions (needed for each activity)

Lecture of study course	• Classroom with blackboard and projector	
Activity type	Seminar and workshop	Projection room with 25 seats (multimedia materials, licensed and original software applications, educational drawings and slides); Marine Engine Room Simulator NORCONTROL type, multifunctional laboratory - UMC Nautical Base (flow chart control boards, view and inspection of particular machine parts, educational drawings)
	Laboratory	-
	Project	-

6. Specific abilities acquired

Professional abilities	<ul style="list-style-type: none"> Ability to identify, analyze and describe the function of maritime electromechanical systems
Transversal abilities	<ul style="list-style-type: none"> The use of techniques for efficient human relations in a multicultural staff, on different levels of hierarchy, in speech or written form of communication and with different departments or fields of activity

7. Objectives of Study Subject (from the abilities acquired)

General objective of Study Subject	<ul style="list-style-type: none"> Functional understanding and knowledge of performance of maritime internal combustion engines Establishing of a mathematical model that describes the analyzed phenomenon and finding solutions to the problems of the specific model. The solutions can be found by analytical methods or numerical methods. The analytical methods can give solutions in the form of formulas (series or integrals) so that for each value of argument can be obtained a value of function. Numerical methods on the other hand can give the value of a function for certain numerical values of argument, so the solution can be given for some points of definition domain. The analytical methods can be precise or approximate, depending on the use of simplified hypothesis for solving the mathematical model. The analytical methods can be very diverse, some of them can be used to solve linear equations, others for solving of the nonlinear equations. For solving the linear problems, can be used method of variable separation, operational methods, method of potential theory, method of fundamental functions, etc. For the solving of nonlinear problems, can be used the variational method, integral method, iterations method, finite differences method, colocation method, Galerkin method, momentum method.
------------------------------------	---

8. Contents

Course	hours	Methods of presentation	Observations
<ul style="list-style-type: none"> Fundamental Equations of thermogazodinamics, gases flow through nozzles and geometric diffuser <ul style="list-style-type: none"> Continuity equation Energy conservation equation Equation of conservation of movement quantity momentum Equation of vortex movement Units and equations specific to the flow of tho-phase monocomponents Axial geometrical diffuser for the perfect gas The perfect gas transformation of kinetic energy into potential energy Pressure loss through subsonic geometric diffuser 	10	Classic + projections	
<ul style="list-style-type: none"> Disturbances in flow, impact wave, jet thermogazodinamics <ul style="list-style-type: none"> Supersonic flow characteristics of perfect gases Thermofazic units of fluids in shock waves The spread of disturbances in two-phase monocomponent medium The speed of travel of impact wave in two-phase monocomponent medium Analytical calculation of units specific to axial simetric jet Theoretical study of vortex jet Technical applications of vortex jets 	10	Classic + projections	
<ul style="list-style-type: none"> Dynamic calculation of vibrations on systems with one degree of freedom and finite number of degrees of freedom <ul style="list-style-type: none"> General movement equation 	10	Classic + projections	

<ul style="list-style-type: none"> Free Vibrations Forced vibrations, balanced and unbalanced vibrations Methods of forces for the study of vibrations of elastic systems Displacement method for the study of vibrations of elastic systems Establishing of movement equations using Lagrange equations 			
<ul style="list-style-type: none"> Approximate methods in dynamic of elastic systems <ul style="list-style-type: none"> Approximate methods for determination of angular frequency Approximate methods for determination of forced vibrations Method of finite elements for the study of free vibrations and forced vibrations 	12	idem	
Bibliography			
<ul style="list-style-type: none"> Buzbuchi, N., Sabău, A.: <i>Motoare diesel navale. Procese, construcție, exploatare</i>, ISBN 973-8143-77-2, Editura Bren, București, 781 pag., 2001; Editura Ex Ponto (ediția a II-a), ISBN 973-8227-20-8, Constanța. Ștefănescu, D., Marinescu, M., Ganea, I. <i>Termogazodinamică tehnică</i>, Editura Tehnică, București, 1986 Buzbuchi, N. Șoloiu, V.A., Dinescu, C., Lyridis D.V. <i>Motoare navale. Vol. 2: Supraalimentare* Dinamică</i>, Editura Didactică și Pedagogică, București, 1998. Carabogdan, I., Badea, A., Brătianu, C., Mușatescu, V. <i>Metode de analiză a proceselor și sistemelor termoeenergetice</i>, Editura Tehnică, București, 1989 Reynolds, A., J. <i>Curgeri turbulente in tehnică</i>, Traducere din limba engleză, dr. ing. Ștefan Săvulescu, Editura Tehnică, București, 1982 Buzbuchi, N., Șoloiu, V.A., Dinescu, C. Lyridis, D.V. <i>Motoare navale. Vol. 2: Supraalimentare* Dinamică</i>, ISBN 973-30-5491-7, Editura Didactică și Pedagogică, București, 1998 Buzbuchi, N., Dinescu, C. <i>Vibrațiile motoarelor navale</i>, Tipografia Universitatii Maritime Constanta, 1993. Posea, N. <i>Calculul dinamic al structurilor</i>, Editura Tehnica, Bucuresti, 1991. Pestel, E.C., Leckie, F.A. <i>Matrix Methods in Elastomecncics</i>, McGrow-Hill Book C-ny Inc., New York, 1963. 			



Aplications (Workshop/ laboratory / project)	hours	Methods of teaching	Observations
Seminar: <ul style="list-style-type: none"> Fundamental Equations of thermogazodinamics, gases flow through nozzles and geometric diffuser Disturbances in flow, impact wave, jet thermogazodinamics Dynamic calculation of vibrations on systems with one degree of freedom and finite number of degrees of freedom Approximate methods in dynamic of elastic systems 	10	Explanations and practical exercises	Licensed and original software applications
	10		
	10		
	12		
Bibliography			
<ul style="list-style-type: none"> Ștefănescu, D., Marinescu, M., Ganea, I. <i>Termogazodinamică tehnică</i>, Editura Tehnică, București, 1986 			
Bibliografie minimală			
<ul style="list-style-type: none"> Carabogdan, I., Badea, A., Brătianu, C., Mușatescu, V. <i>Metode de analiză a proceselor și sistemelor termoeenergetice</i>, Editura Tehnică, București, 1989 			

9. Evaluation of the contents of the study subject in the view of epistemic community, professional associations and of the representatives from the field of study

<ul style="list-style-type: none"> The contents of the study subject are in accordance with thematic and consistency with STCW Module Courses 7.02, 7.04.
--

10. Examination

Activity type	Evaluation criteria	Evaluation method	Share from final evaluation
Lecture course	Examination during exam term	Written examination	80%
Seminar			20%
Standard of minim performance			
<ul style="list-style-type: none"> Identification of constructive elements of an electromechanical system, feature analyzes, description of functional processes during normal running of the system 			

Date of elaboration	Signature of study course lector/professor	Signature of seminar lector
10.10.2020		

Date approved by Department	Signature of Head of Department
10.10.2020	

Date approved by Academic Council	Signature of the Dean
20.10.2020	