

DISCIPLINE RECORD**1. Program data**

University	CONSTANTA MARITIME UNIVERSITY
Faculty	Naval Electromechanical Faculty
Department	Engineering Sciences in the Mechanical and Environmental Field
Field of study	Mechanical Engineering
Study cycle	Doctoral study
Study program	Program based on advanced doctoral studies

2. Discipline data

Name of the discipline		Mathematical Modelling and Numerical Simulation in Fluid Mechanics. Dimensional Analysis and Similarity Theory			
Head of the discipline courses		Prof. Dr. Ing. Dumitru DINU			
Head of the discipline labs		Ș.L. Dr. Ing. Andrei SCUPI			
Year	1	Semester	I	Tipul de evaluare	
Status of discipline	Formative category: DF – fundamental, DD - în the field, DS - speciality, DC - complementary				DD
	Category of optionality: DO - compulsory, DA - optional, DL - facultative				DO

3. Total time estimated

I a) Hours/week	9	Cours	3	Seminary	-	Lab	3	Project	-
I b) Hours semester	84	Cours	42	Seminary	-	Lab	42	Project	-

II Distribution:	ore
II a) Study	50
II b) Suplimentary documentation	50
II c) Preparation of seminars, laboratories, etc.	10
II d) Tutoring	10
III Evaluation	4
IV Other activities	

Total hours individual study II (a+b+c+d)	120
Total hours per semester (Ib+II+III+IV)	208
Credits	15

4. Preconditions (where applicable)

Curriculum	•
Competences	•

5. Conditions (where applicable)

Cours	•	
Labs	Seminary	•
	Lab	•
	Project	•

6. Skills

Profesional skills	• Knowledge of hydraulic and pneumatic phenomena in installations.
Transversal skills	• Use of ANSYS FLUENT program

7. Obiectivs

General objective	<ul style="list-style-type: none"> Basic information of the action of marine environment on ships and naval structures.
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8. Content

Cours	Hours/week	Observations
C1. Equations of ideal fluid motions.	4	
C2. Equation of continuity	2	
C3. Impulse and moment impulse theorem	2	
C4. Equation of Hydrostatics	2	
C5. The floating bodies	2	
C6. Potential Motion	2	
C7. Plan potential motion	2	
C8. Dynamic of real fluid	4	
C9. Lamina and turbulent motion of fluids.	4	
C10. Boundary layer theory	4	
C11. Hydrodynamic profiles	4	
C12. Dimensional analysis	4	
C13. Theory of similarity	4	
C14. Waves theory	2	
Bibliography		
<ul style="list-style-type: none"> DINU, D. , „Mecanica fluidelor pentru navigatori”, Ed. Nautica, Constanța, 2010 DINU D., „Hydraulics and hydraulic machines”, SIGMA Editions, 1999. IONESCU D. “Introducere în mecanica fluidelor”, Ed. Tehnică, 2004. ANDREI V. „Mecanica fluidelor – Elemente de teoria similitudinii și de strat limită”, Ed. Zigotto, Galați, 2010. VASILESCU Al. A. „Analiza dimensională și teoria similitudinii”, Ed. Academiei, București, 1974. SCUPI A., DINU D. „Fluid Mechanics, Numerical Approach”, Ed Nautica, 2015. 		
Minimal Bibliography		
<ul style="list-style-type: none"> Dinu, D. , ”Hydraulics and hydraulic machines”, SIGMA Editions, 1999. SCUPI A., DINU D. „Fluid Mechanics, Numerical Approach”, Ed Nautica, 2015. 		

Seminary	No. hours	Teaching methods	Observations
• L1. CFD. Structure of the program.	2		
• L2. CAD. 2D and 3D	3		
• L3. Heat transfer.	2		
• L4. Bernoulli Equation. Numerical simulation.	4		
• L5. Loss of load. Numerical simulation.	4		
• L6 Local loss of load, Numerical simulation.	4		
• L7. Flow through hydrodynamic profile. Numerical simulation.	3		
• L8. Blower.	2		
• L9. Axial fan	6		
• L10. Diaphragm.	2		
• L11. Compressor	2		
• L12. Safety valve.	4		
• L13. Heat exchanger	6		
L14 Flow through circular conduits. Magnus effect.	4		
Bibliography			
<ul style="list-style-type: none"> Dinu, D. , „Mecanica fluidelor pentru navigatori”, Ed. Nautica, Constanța, 2010 Scupi A., Dinu D. „Fluid Mechanics. Numerical Approach”, Ed. Nautica, 2015. 			
Minimal Bibliographie			
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9. Evaluation

Forms of activity	Evaluation	Methods	Percentage of the final grade
Curs	Exam	Written exam	80%
Seminar	Partial tests	Simulator evaluation	20%
Laboratory			
Project			
Minimal standard			
• Average 7/ Good			

Date	Head of the discipline course	Head of the discipline labs
08.10.2019		

Date of approval in CSD	Doctoral school director
15.10.2019	