

Subject card

Subject name and code	Thermodynamics of Sea Water - laboratory, PG_00206213						
Field of study	Oceanography						
Date of commencement of studies	October 2026	Academic year of realisation of subject			2026/2027		
Education level	Master's studies	Subject group			Obligatory subject group in the field of study Optional subject group Subject group related to scientific research in the field of study		
Mode of study	full-time studies	Mode of delivery			at the university		
Year of study	1	Language of instruction			Polish		
Semester of study	2	ECTS credits			2.0		
Learning profile	academic	Assessment form			credit		
Conducting unit	Department of Geophysics -> Faculty of Oceanography and Geography -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Marcin Paszkuta				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	20.0	0.0	0.0	20
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM		
	Number of study hours	20	1.0	29.0	50		
Subject objectives	Mastering the skills of calculation (description of phenomena) and understanding physical processes occurring in the marine environment; determining and calculating physical relationships; the importance of natural laws in seawater thermodynamics.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[OCEANMU2-U06] is able to use specialized computer software as well as advanced mathematical and statistical methods to analyze data and describe processes and phenomena occurring in the marine and coastal environment; evaluates their reliability and usefulness and performs critical analysis	Can use advanced mathematical methods in relation to seawater thermodynamics processes at an in-depth level.			[SU4] test/exam - oral or written [SU8] observation of student's independent or team work		
Subject contents	B. Exercise topics: B.1 Fundamentals of phenomenological thermodynamics, B.2 Seawater physical medium, B.3 Thermodynamic potentials, B.4 Thermodynamic susceptibilities, B.5 Thermodynamic processes of seawater, B.6 Phase transition equation of state, B.7 Maxwell relations, B.8 Molecular molar quantities, B.9 Thermal expansion of seawater, B.10 Compressibility of seawater, B.11 Potential temperature and potential density in the sea, B.12 Change in seawater volume as a function of salinity, B.13 Coupled processes thermodiffusion.						
Prerequisites and co-requisites	Knowledge of the fundamentals of mathematics and physics at the university level						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	final written examination	51.0%	90.0%
	in-class activities	51.0%	10.0%
Recommended reading	Basic literature	1. Hołyst. R., 2003. Termodynamika dla chemików, fizyków i inżynierów. Instytut Chemii Fizycznej PAN i Szkoła Nauk Ści-słych, Warszawa	
	Supplementary literature	Leyendekkers. J.V., Hood W. D., 1976. Thermodynamics of Seawater. New York, ISBN 0-8247-6486-2;	
	eResources addresses		
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. Thermodynamic potentials, 2. Thermodynamic susceptibilities, 3. Thermodynamic processes of seawater, 4. Phase transition equation of state, 5. Maxwell relations 		
Work placement	Not applicable		

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