University of Gdańsk

Subject card

Subject name and code	Satellite Oceanography - lecture, PG_00204984		
Field of study	Oceanography		
Date of commencement of studies	October 2027	Academic year of realisation of subject	2028/2029
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	2	Language of instruction	Polish
Semester of study	3	ECTS credits	1.0
Learning profile	academic	Assessment form	exam
Conducting unit	Laboratory of Physical Oceanography -> Department of Physical Oceanography and Climate Research -> Faculty of Oceanography and Geography -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	dr Aleksandra Cupiał	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	0.0	0.0	0.0	15

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	15	1.0	9.0	25

Subject objectives

Introducing students to aspects of oceanography that can be investigated from a satellite perspective, including remote sensing techniques, with particular emphasis on microwave techniques, satellite databases, and methods for their processing and analysis

Learning outcomes

Course outcome	Subject outcome	Method of verification
[OCEANMU2-W04] has an in-depth understanding of the latest research trends in oceanography, as well as the possibilities for practical application of related achievements; evaluates their usefulness and limitations in solving scientific research problems, and critically analyzes and assesses their applicability	The student knows and understands in-depth the latest trends in oceanographic research using satellite remote sensing devices and systems	[SW4] test/exam - oral or written
[OCEANMU2-W03] has an in-depth understanding of research methods used in oceanography and related sciences, and interprets their mechanisms and interrelationships across different spatial and temporal scales	The student knows and understands in-depth research methods used in the work of an oceanographer to describe and interpret phenomena and processes occurring in the aquatic environment using satellite data	[SW4] test/exam - oral or written
[OCEANMU2-W01] knows and understands in-depth specialized terminology used in oceanography and related sciences (in Polish and a selected foreign language)	The student knows and understands in-depth specialized terminology related to satellite remote sensing methods used in oceanography, in particular microwave techniques.	[SW4] test/exam - oral or written

<table>
<tr><td>Subject contents</td><td>1. Satellite techniques used in Earth Observation. Basic concepts of satellite remote sensing.

2. Spatial and temporal scales of marine phenomena. Applications and limitations of satellite remote sensing in monitoring, e.g.:
- large-scale Phenomena (e.g., ice cover in polar regions, El Niño)
- mesoscale and submesoscale Phenomena (e.g., eddies, fronts, coastal upwelling, internal waves)
- aquatic productivity (types 1 and 2 waters)
- coastal zones (bathymetry, river plume extent, shoreline changes)
- potential hazards (oil spills, iceberg trajectories, anthropogenic atmospheric pollution).

3. Satellite data in temporal trend analysis and ecohydrodynamic modeling

4. Operational earth observation programs. Overview of sensors and available data for Marine Areas and coastal zones (parameters, temporal and spatial resolution).

5. Synergy of data from different satellite systems. Methods for assessing satellite data quality. Filtering, transforming, segmentation and classification methods for image data analysis.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Knowledge of the basics of satellite remote sensing and GIS</td></tr>
<tr><td>Assessment methods and criteria</td><td><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>test</td><td>51.0%</td><td>100.0%</td></tr></table></td></tr>
<tr><td>Recommended reading</td><td><table><tr><td>Basic literature</td><td>• Robinson I., 2010. Discovering the Oceans from Space: The unique applications of satellite oceanography, Springer-Verlag, Berlin and Heidelberg
• Emery W., Camps A., 2017, Introduction to Satellite Remote Sensing. Atmosphere, Ocean, Land and Cryosphere Applications, Elsevier</td></tr><tr><td>Supplementary literature</td><td>• Berizzi F., Martorella M., Giusti E., 2016, Radar Imaging for Maritime Observation, CRC Prss, Taylor & Francis Group 348 s.
• Martin S., 2004, An introduction to Ocean Remote Sensing, Cambridge University Press, 426 s.
• Chapman R., Gasparovic R., 2022, Remote sensing physics: an introduction to observing earth from space, Wiley, Hoboken USA, 468 ss.
• Chang N.-B., Bai K., 2018, Multisensor data fusion and machine learning for environmental remote sensing, CRC Press, Boca Raton, 508 ss.</td></tr><tr><td>eResources addresses</td><td></td></tr></table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>Assessment criteria: Knowledge of

• physical processes occurring in the sea that can be studied using satellite methods
• satellite techniques used to study specific processes in the sea sea
• surface properties that enable remote detection of the phenomena discussed in the lecture
• satellite data processing stages necessary to obtain specific environmental information from satellite data
• spatial data analysis methods used in the analysis of satellite data in oceanography</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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