University of Gdańsk

Subject card

Subject name and code	Satellite oceanography - lecture, PG_00117839		
Field of study	Oceanografia satelitarna - wykład (Wykład)		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2025/2026
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	dr Aleksandra Cupiał	

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

eNauczanie source addresses:

Moodle ID: 12984 OCEAN-MU2DZ-(2025/2026) Oceanografia satelitarna
https://mdl.ug.edu.pl/course/view.php?id=12984

Additional information:

Wykład z prezentacją multimedialną. W razie potrzeby wykład może być prowadzony online

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	2.0	13.0	30

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] knows and understands the latest research trends in the field of oceanography as well as the possibilities of practical application of scientific achievements	The student knows and understands in-depth the latest trends in oceanographic research using satellite remote sensing devices and systems	[SW4] test/egzamin - ustny lub pisemny
[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/egzamin - ustny lub pisemny
[OCEANMU2-W03] knows and understands research methods used in oceanography and related sciences	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/egzamin - ustny lub pisemny

Subject contents

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:
- 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 and classification methods for image data analysis.

Prerequisites and co-requisites

Knowledge of the basics of satellite remote sensing and GIS

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
	50.0%	100.0%

Recommended reading

Basic literature	• 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
Supplementary literature	• 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.
eResources addresses	

Example issues/ example questions/ tasks being completed

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

Work placement

Not applicable

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