<table>
<tr><td colspan="4">*Course*: Basics of environmental management and protection</td></tr>
<tr><td colspan="4">*Field of study*: geography</td></tr>
<tr><td>*Class format*</td><td>*Class hours*</td><td>*ECTS*</td><td>*Language*</td></tr>
<tr><td>Lectures</td><td>15</td><td rowspan="2">3</td><td rowspan="2">English</td></tr>
<tr><td>Practicals</td><td>15</td></tr>
<tr><td>*Coordinator:*</td><td colspan="3">Przemysław Śmietana, Ph.D., D.Sc.</td></tr>
<tr><td>*Course objectives:*</td><td colspan="3">Acquiring knowledge about threats to the structure and functioning of the natural environment of the Earth as well as economic, natural and ethical grounds for the need to protect it.
Acquiring skills in using modern methods and means of identifying threats to the Earth's natural environment as well as methods and means of its protection and their legal conditions on a national and international scale. Shaping the attitude for initiating and co-organizing activities related to environmental protection.</td></tr>
<tr><td>*Prerequisites:*</td><td colspan="3">Basic knowledge of ecology and the environment; ability to work with various natural and statistical sources</td></tr>
<tr><td colspan="4">*Course content matter*</td></tr>
<tr><td colspan="4">1. Basic concepts and problems of use of the environment and environmental protection
2. Natural and anthropogenic transformations of the environment
3. Degradation phenomena and processes in nature
4. The state of the environment in the world and in Poland
5. Biodiversity, its importance and threats
6. National and international strategy for environmental protection
7. Forecasting and assessment of future environmental threats</td></tr>
<tr><td>*Instruction methods*</td><td colspan="3">Lectures. Practical assignments, data-mining and synthesis in team presentations.</td></tr>
<tr><td>*Course approval format and conditions*</td><td colspan="3">Passing grade at written examination. Practical laboratory - approval of individual assignments.</td></tr>
<tr><td>*Required reading*</td><td colspan="3">Malik A., Grohmann E. (Editors) 2012. Environmental Protection Strategies for Sustainable Development. Imprint: Springer, https://link.springer.com/content/pdf/10.1007%2F978-94-007-1591-2.pdf
Poulopoulos S., Inglezakis, V. (Editors) 2016. Environment and Development: Basic Principles, Human Activities, and Environmental Implications. Imprint: Elsevier
Ciechanowicz-McLean J., Nyka M. 2016. Environmental Law Environmental Law. Imprint: Wydawnictwo Uniwersytetu Gdańskiego
Sulphey M.M. Introduction to environment management. Imprint: PHI Learning</td></tr>
</table>

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: **USSPR-O-O-I-S-22/23Z**	
Unit: **Podstawy paleooceanografii [moduł]**	
Course title: **basics of palaeoceanography (podstawy paleooceanografii) (KIERUNKOWE)**	Course code: **SPR38AIJ3446_27S**
Name of field of study: **oceanografia**	
Mode and cycle of study: **first-degree, full - time**	Profile of study: **general academic** / Specialty:
Course / module status **elective**	Language of instruction: **semester: 4 - polish language**

Year	Semester	Form of instruction	No. of hours	w tym e-learning	Type of credit	ECTS
2	4	discussion classes	15	0	pg	3
		lecture	15	0	e	
Total			**30**			**3**

Course / module coordinator	**dr PRZEMYSŁAW DĄBEK**
Course instructor	**dr PRZEMYSŁAW DĄBEK**
Course / module objectives	**Acquiring by students a basic knowledge, skills and social competences related to the latest views on the genesis and development of the oceans, on the functioning of the ocean-atmosphere system today and in the geological past, and on the role of the oceans in shaping and regulating the Earth's climate.**
Prerequisites	**Basic knowledge of geology, including marine geology, climatology and meteorology, and physical and chemical oceanography.**

LEARNING OUTCOMES

Category	No.	Code	Description	Ref. to programme benchmarks
knowledge	**1**	**EP1**	**Student understands the origin and evolution of ocean basins, as well as the functioning of the ocean-atmosphere system at present and in deep time.**	**K_W03**
skills	**1**	**EP2**	**Uses the available sources for looking up information (e.g., latest scientific publications).**	**K_U03**
	2	**EP3**	**Student links information from the available sources and simple data generated in class.**	**K_U09**
	3	**EP4**	**Student acquires paleoceanographic data under the mentor's supervision.**	**K_U02**
social competences	**1**	**EP5**	**Student understands the need to perpetually improve his or her skills.**	**K_K02**

CONTENT	Semester	No. of hours	w tym e-learning
Subject title: **basics of palaeoceanography (podstawy paleooceanografii)**			
Format of instruction: **lecture**			
1. **Aim and scope of paleooceanographic research. History of the development of paleooceanography. Research material.**	4	2	0
2. **Formation of the lithosphere, hydrosphere, atmosphere and ocean basins. Dating of marine sediments.**	4	2	0
3. **Paleoreconstructions of temperature, salinity, biological production of seas and oceans.**	4	4	0
4. **Reconstructions of depth, paleocurrents, paleotides, paleostorms and ocean circulation.**	4	4	0

5. **The main climatic and geological events of the Cenozoic.**	4	3	0
Format of instruction: **discussion classes**			
1. **Basics of laboratory work related to the collection and analysis of samples from sea and ocean cores. Laboratory preparation of samples**	4	4	0
2. **Paleooceanographic databases. Search for information about core information from ocean drilling. The process of ordering samples from DSDP / ODP / IODP. Analysis of significant paleooceanographic phenomena of the Cenozoic.**	4	4	0
3. **Biostratigraphic data. Performing the depth-age model and the linear rate of sedimentation (LSR).**	4	4	0
4. **Determination of water palaeotemperature with UK37 and TEX86 methods.**	4	3	0

Modes of delivery	**Laboratory and computer analyzes. Lectures in the form of a multimedia presentation based on the author's script.**	
Assessment methods		No. of learning outcome from the syllabus
	EGZAMIN PISEMNY	**EP1**
	ZAJĘCIA PRAKTYCZNE (WERYFIKACJA POPRZEZ OBSERWACJĘ)	**EP2,EP3,EP4,EP5**
	Metody i formy weryfikacji efektów uczenia się mogą zostać zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach określonych w Regulaminie Studiów Uniwersytetu Szczecińskiego.	
Grading criteria	**Oral examination verifies the knowledge gained during lectures. Graduation from practical sessions based on completion of practical assignments.**	
	Grade calculation principles	
	Final grade is an arithmetic average.	

Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	4	basics of palaeoceanography (podstawy paleooceanografii)		Ważona	
	4	basics of palaeoceanography (podstawy paleooceanografii) [ćwiczenia]	zaliczenie z oceną		0,40
	4	basics of palaeoceanography (podstawy paleooceanografii) [wykład]	egzamin		0,60

Basic reading	Fisher, G. & Wefer, G. (Ed.) (1999): Use of proxies in paleoceanography: Examples from the South Atlantic. Students receive from the tutor pdfs of selected and discussed in class issues., Springer
	Hillaire-Marcel, C. & de Vernal, A. (Ed.). (2007): Proxies in late Cenozoic paleoceanography. Students receive from the tutor pdfs of selected and discussed in class issues., Elsevier
Supplementary reading	Haq. B.U & Boresma, A. (Ed.) (1978): Introduction to marine micropaleontology., Elsevier
	Schopf, T.J.M. (1982): Paleooceanography
	Seibold, E. & Berger, W. (Ed.). (2017): The sea floor: an introduction to marine geology. Students receive from the tutor pdfs of selected and discussed in class issues., Springer

STUDENT WORKLOAD

	No. of hours	
		W tym e-learning
Contact hours	**30**	**0**
Participation in test / exam	**2**	**0**
Preparation for contact hours	**8**	**0**
Private reading and studying	**10**	**0**
Participation in tutorials	**5**	**0**
Preparation of project / essay / etc.	**10**	**0**
Preparation for test / exam	**10**	**0**
TOTAL workload	**75**	
ECTS credits	**3**	

<table>
<tr><td colspan="4">*Subject*: Biological invasions</td></tr>
<tr><td colspan="4">*Field of study*: oceanography, 1st degree, summer semester</td></tr>
<tr><td>*Form of classes*</td><td>*Class hours*</td><td>*ECTS*</td><td>*Language*</td></tr>
<tr><td>lectures</td><td>10</td><td rowspan="3">4</td><td rowspan="3">English</td></tr>
<tr><td>laboratory</td><td>20</td></tr>
<tr><td>field trip</td><td>15</td></tr>
<tr><td>*Coordinator:*</td><td colspan="3">dr inż. Jakub Skorupski</td></tr>
<tr><td>*Objectives of the subject:*</td><td colspan="3">familiarization with theories, methods and concepts of scientific foundations of invasion biology</td></tr>
<tr><td>*Requirement:*</td><td colspan="3">Basics of general biology and ecology</td></tr>
<tr><td colspan="4">*Program content*</td></tr>
<tr><td colspan="4">1. Introduction – definition, terminology and concepts
2. Non-indigenous species and cryptogenic species
3. Biological invasions and invasive species
4. The invasion proces. Pathways and vectors. Origin and distribution of invasive non-indigenous species
5. Invasion ecology
6. Biological invasions – risk assessment, predicting and preventing invasion
7. Socio-economic costs of non-indigenous species invasions. Impact of biological invasions on ecosystem services
8. Management, eradication and control of non-indigenous invasive species. Law on non-native species
9. Global climate change and invasive species
10. Guided field trip – invasive non-indigenous species in Poland</td></tr>
<tr><td>*Educational methods*</td><td colspan="3">• lecture
• multimedia presentation
• work in groups
• problem discussion
• case study analysis</td></tr>
<tr><td>*Form and conditions of passing the subject*</td><td colspan="3">Written exam</td></tr>
<tr><td>*Literature*</td><td colspan="3">1. Lockwood J.L., Hoopes M.F., Marchetti M.P. 2013 (or earlier edition). Invasion Ecology. John Wiley & Sons, Ltd. Oxford
2. Nentwig W. (ed.). 2008. Biological Invasions. Springer-Verlag. Berlin
3. Skorupski J. (ed.) et al. 2017. Invasive Alien Species – identification of threats to protect biodiversity. Polish Society for Conservation Genetics LUTREOLA. Szczecin
4. Biological Invasions (Springer)</td></tr>
</table>

Course: **Biological oceanography**			
Field of study: oceanography			
Class format	*Class hours*	*ECTS*	*Language*
Lectures	30	7	English
Laboratory	45		
Coordinator:	Przemysław Śmietana, Ph.D., D.Sc.		
Course objectives:	Acquiring knowledge about the structure and functioning of oceanic ecosystems in the context of the relationship between abiotic factors and biotic parameters in the view of regional and global oceanographic and climate processes. Mastering the basic methods and techniques used in biological marine studies.		
Prerequisites:	Basic knowledge of biology, ecology and physical oceanography acquired in previous oceanography courses		
Course content matter			
1. Characteristics of areas of the marine environment and the restrictions they place on organisms and biocoenosis 2. Characteristics of the basics of functioning of marine ecosystems 3. Characteristics of the basic categories of ecological marine organisms 4. Processes and interactions in benthic-pelagic coupling 5. Processes and interactions in the coastal zone and estuaries 6. Characteristic marine ecosystems (coral reefs, mangroves, biocoenosis based on chemosynthesis) 7. Deep-sea ecosystems			
Instruction methods	Lectures. Practical assignments, data-mining and synthesis in team presentations.		
Course approval format and conditions	Passing grade at written examination. Practical laboratory - approval of individual assignments.		
Required reading	Miller C.B. 2012. Biological Oceanography. John Wiley & Sons Kaiser M.J., Attrill M.J., Jennings S. et al. 2005. Marine Ecology. Processes, Systems, and Impacts, Oxford University Press, Oxford		

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: **USSPR-O-O-I-S-21/22Z-GM**	
Unit: **Ochrona i inżynieria strefy brzegowej [moduł]**	
Course title: **coastal protection and engineering (SPECJALNOŚCI / SPECJALIZACJE / MODUŁY SPECJALNOŚCIOWE)**	Course code: **US38AIJ2826_40S**
Name of field of study: **oceanografia**	
Mode and cycle of study: **first-degree, full - time**	Profile of study: **general academic** / Specialty: **geologia morza**
Course / module status **elective**	Language of instruction: **semester: 6 - english language**

Year	Semester	Form of instruction	No. of hours	w tym e-learning	Type of credit	ECTS
3	6	discussion classes	10	0	pg	3
		lecture	10	0	e	
Total			**20**			**3**

Course / module coordinator	**dr hab. JOANNA DUDZIŃSKA-NOWAK**
Course instructor	**dr hab. JOANNA DUDZIŃSKA-NOWAK**
Course / module objectives	**Presenting the issues related to threats to coastal stability and their causes, as well as methods of coastal protection used in coastal engineering. Developing the ability to link the phenomena and processes taking place in the coastal zone with the engineering activity of man in this zone.**
Prerequisites	**Completed course in the field of marine geology, marine physics and coastal geomorphology or coastal zone dynamics**

LEARNING OUTCOMES

Category	No.	Code	Description	Ref. to programme benchmarks
knowledge	1	EP1	Understands the basic phenomena and processes related to the structure and functioning of the marine coastal zone environment.	K_W05
	2	EP2	Describes and interprets the phenomena occurring under the influence of human engineering activities in nature of the seashore	K_W01
	3	EP3	Has knowledge of the basic conceptual categories and terminology used in coastal engineering and coastal morphodynamics and knows the methods of coastal protection used	K_W07
skills	1	EP4	demonstrates the ability to draw conclusions based on the literature on the subject and synthesize information from various sources and data obtained as a result of conducted observations	K_U02 K_U07
	2	EP5	Is able to identify the causes of erosion hazards occurring in the coastal zone of the sea and propose methods of preventing their effects	K_U01
	3	EP6	Can predict the impact of engineering and various methods of shore protection on the development of shores	K_U09
social competences	1	EP7	He understands the need to protect the environment of the coastal zone and preserve its geodiversity and biodiversity	K_K04

CONTENT	Semester	No. of hours	w tym e-learning

Subject title: **coastal protection and engineering**			
Format of instruction: **lecture**			
1. **null**	6	1	0
2. **Coastal protection methods. Definitions and categories of revetments.**	6	1	0
3. **Natural methods of strengthening the shore. Biological fixation of dunes and stabilization of cliff slopes.**	6	2	0
4. **Artificial strengthening of the shore. Hydrotechnical structures.**	6	4	0
5. **Artificial shore recharge. Flood embankments.**	6	0	0
6. **Criteria for planning and designing shore and bottom protection structures.**	6	2	0
Format of instruction: **discussion classes**			
1. **The need of coastal protection.**	6	1	0
2. **Analysis of the impact of various methods of protection on the processes of erosion, transport and accumulation of the sediments.**	6	4	0
3. **Concept and method of strengthening the selected section of the coast.**	6	3	0
4. **Presentation of the suggested protection method of of the selected coastal section.**	6	2	0

Modes of delivery	**An original lecture with the use of a multimedia presentation and a mouvie, explaining the described phenomena and relationships. Classes: work on diagrams and models with computer analysis of results.**	
Assessment methods		No. of learning outcome from the syllabus
	EGZAMIN PISEMNY	**EP1,EP3,EP7**
	ZAJĘCIA PRAKTYCZNE (WERYFIKACJA POPRZEZ OBSERWACJĘ)	**EP2,EP4,EP5,EP6**
	Metody i formy weryfikacji efektów uczenia się mogą zostać zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach określonych w Regulaminie Studiów Uniwersytetu Szczecińskiego.	
Grading criteria	**Lecture: Passing the written exam.** **Classes: Passing the classes on the basis of partial grades obtained for the performance of individual tasks.**	
	Grade calculation principles	
	The course grade is the arithmetic mean of the grades from the lectures and classes	

Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	6	coastal protection and engineering		Arytmetyczna	
	6	coastal protection and engineering [ćwiczenia]	zaliczenie z oceną		
	6	coastal protection and engineering [wykład]	egzamin		

Basic reading	
	Basiński T., Pruszak Z., Tarnowska M., Zeidler R. (1993): Ochrona brzegów morskich, IBW PAN, Gdańsk
	Cooper J.A.G., Pilkey O.H. (red.) (2012): Pitfalls of Shoreline Stabilization: Selected Case Studies, Coastal Research Library 3, Springer
	Dubrawski R., Zawadzka-Kahlau E., (red.) (2006): Przyszłość ochrony polskich brzegów morskich,, Instytut Morski Gdańsk
	Kostrzewski A., Musielak S., (2008): Współczesne przemiany rzeźby wybrzeża Południowego Bałtyku. W: Współczesne przemiany rzeźby Polski, red. L. Starkel i in., , IGIGP, Kraków
	Musielak S., (2006): Geneza i funkcjonowanie systemu przyrodniczego morskiej strefy brzegowej. W: ZZOP t.2 Brzeg Morski - zrównoważony, red. K. Furmańczyk, , INoM US, Szczecin
	Pruszak Z., (1999): Dynamika brzegów i dna morskiego., IBW PAN, Gdańsk
	Reeve D., Chadwick A., Fleming Ch. (2004): Coastal Engineering. Processes, Theory and Design Practice, Spon Press, Taylor & Francis Grou, London–New York

Supplementary reading	Dudzińska-Nowak J. (2006): Coastline Long-term Changes of the Selected Area of the Pomeranian Bay, w: Tubielewicz A. (red), Coastal Dynamic, Geomorphology and Protection, EUROCOAST–LITTORAL, Gdańsk
	Onoszko J., Tarnowska M., Zeidler R., (1980): Hydrodynamiczne badania modelowe..., Cz. I. Hydro- i litodynamiczne procesy w morskiej strefie brzegowej, , PWN, Warszawa
	Reeve D. (2010): Risk and reliability: coastal and hydraulic engineering, Spoon Press, Taylor & Francis Group, London–New York
	Schwartz M. L., (red.) (2005): Encyclopedia of coastal science,, Springer, Washington
	Zawadzka-Kahlau E., (1999): Tendencje rozwojowe brzegów Bałtuku Południowego, GTN, Gdańsk
	Zeidler R., (1993): Studium ochrony polskiego brzegu w warunkach przyspieszonego wzrostu poziomu morza (efektu szklarniowego), , Inżynieria morska i geotechnika, nr 1, Gdańsk

STUDENT WORKLOAD

	No. of hours	
		W tym e-learning
Contact hours	**20**	**0**
Participation in test / exam	**2**	**0**
Preparation for contact hours	**13**	**0**
Private reading and studying	**10**	**0**
Participation in tutorials	**15**	**0**
Preparation of project / essay / etc.	**0**	**0**
Preparation for test / exam	**15**	**0**
TOTAL workload	**75**	
ECTS credits	**3**	

Nazwa przedmiotu: Course name: Cultivation of diatoms for industrial application	Kod przedmiotu: Course code:
Nazwa jednostki realizującej przedmiot: Name of the department carrying out the subject:	

Rok / semestr: Year / semester:	Status przedmiotu: Course status:	Język przedmiotu: Course language: English

Rok Year	Semestr Semester	Forma zajęć Form of class	Liczba godzin Number of hours	Forma zaliczenia Form of completion	ECTS
		Wykład Lecture	10	Test/colloquium	
		Ćwiczenia Exercise			
		ćwiczenia laboratoryjne Lab exercise	20	Report	
		Konwersatorium discussion session			
		Seminarium seminar			
RAZEM TOTAL			30		

Prowadzący zajęcia Teacher	Ewa Górecka
Cel przedmiotu Course goal	To provide students with a comprehensive understanding of diatoms, their ecology, physiology and methods of cultivation.
Wymagania wstępne Prerequisites	Basic knowledge on biology and ecology. Good written and spoken English skills

EFEKTY UCZENIA SIĘ
LEARNING EFFECTS

Kategoria Category	Opis efektu Effect description	Odniesienie do efektów dla programu Reference to program effects
Wiedza Knowledge	1.	
	2.	
Umiejętnoci Skills	3.	
	4.	
kompetencje społeczne Social competences	5.	

TREŚCI PROGRAMOWE PROGRAMME CONTENT

Forma zajęć: Form of class: Lectures

L.p. No.	Treści Contents	liczba godzin number of hours
1.	Introduction to diatoms: definition, ecology, and diversity	2
2.	Diatom culture techniques & growth kinetics	2
3.	Diatom biomass production: harvesting, drying, and preservation	2
4.	Diatom chemical composition: biosilica, lipids, carbohydrates, and proteins	2
5.	Diatom biotechnology applications, bioprospecting and sustainability	2
Forma zajęć: Form of class: Laboratory		
6.	Microscopic observation of diatoms and their morphology	3
7.	Field trip: collecting living diatom samples	3
8.	Media preparation, sterilization, and isolation techniques	3
9.	Eco-physiological experiments on diatoms strains	4
10.	PBR construction and diatom inoculation	4
11.	Biomass harvesting, lipid and biosilica extraction	3

Metody kształcenia: Educational methods		
Metody weryfikacji efektów uczenia się Verification methods of learning effects		**Nr efektu uczenia się z sylabusa** **Number of effect from the syllabus**
Forma i warunki zaliczenia **Form and conditions of completion**	Grade from the final test/colloquium from the lecture and laboratory part. The grade in the course is the arithmetic average of the grades from the final test/colloquium in the lecture and laboratory parts.	
Literatura podstawowa **Basic literature**	Andersen, R.A. & Kawachi, M. 2005. Traditional microalgae isolation techniques. In Andersen, R.A. [Ed.] Algal culturing techniques. Elsevier, London, pp. 83–100.	
	Barsanti, L. & Gualtieri, P. 2006. Algae: Anatomy, Biochemistry, and Biotechnology. CRC Press, Taylor & Francis Group, Boca Raton, FL, USA, 301 pp.	

	Smol, J.P. & Stoermer, E.F. 2010. The Diatoms: Applications for the environmental and earth Sciences. Second edition. Cambridge University Press
Literatura uzupełniająca **Supplementary literature**	Seckbach, J. & Kociolek, P. The Diatom World. Cellular Origin, Life in Extreme Habitats and Astrobiology, vol 19. Springer, Dordrecht, pp. 21–45.

NAKŁAD PRACY DOKTORANTA:
WORKLOAD OF A STUDENT

	Liczba godzin **Number of hours**
Zajęcia dydaktyczne Classes	30
Przygotowanie się do zajęć Preparation to classes	4
Studiowanie literatury Studying literature	5
Udział w konsultacjach Participation in consultations	2
Przygotowanie projektu / eseju / itp. Preparation of a project / essay / etc.	4
Przygotowanie się do egzaminu / zaliczenia Preparation to exam / completion	5
Łączny nakład pracy studenta w godz. Total workload of a student in hours	50
Liczba punktów ECTS Number of ECTS	

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: **USSPR-Geol-O-II-S-22/223**	
Unit: **Metody badawcze w geologii III [moduł]**	
Course title: **Diatomological workshops** **(POZOSTAŁE PRZEDMIOTY / MODUŁY)**	Course code: **SPR81AIIJ3446_25S**
Name of field of study: **geologia**	
Mode and cycle of study: **second degree, full - time**	Profile of study: **general academic**
Specialty:	
Course / module status **elective**	Language of instruction: **semester: 3 - polish language**

Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS
				w tym e-learning		
2	3	laboratory	15	0	pg	2
Total			**15**			**2**

Course / module coordinator	**dr PRZEMYSŁAW DĄBEK**
Course instructor	**dr ROMAIN GASTINEAU**
Course / module objectives	**Acquiring knowledge and skills useful in lithostratigraphic studies and paleoenvironmental reconstruction based on the analysis of the taxonomic composition of diatoms.**
Prerequisites	**Basic knowledge on geology, biology and light microscopy. Good written and spoken English skills.**

LEARNING OUTCOMES

Category	No.	Code	Description	Ref. to programme benchmarks
knowledge	1	EP2	**Defines the basic concepts of diatomology and knows microfossils and their usefulness in reconstructing paleoenvironments.**	**K_W01 K_W04**
	2	EP3	**Has knowledge in the field of research planning with the use of research methods and tools used in diatomology.**	**K_W08**
	3	EP4	**Knows the rules of occupational health and safety and ergonomics when conducting specialized laboratory and field work.**	**K_W10**
skills	1	EP5	**Is able to use basic methods and techniques in the field of diatomology.**	**K_U01**
	2	EP6	**Has the ability to develop and interpret a selected issue in the field of micropaleontology and demonstrates the ability to critically analyze data.**	**K_U02**
	3	EP7	**Is able to plan and perform research tasks or expert opinions in the field of diatomology.**	**K_U04**
	4	EP9	**Is able to cooperate with other people, adapting to the tasks entrusted to him and the role played in the group.**	**K_U12**
social competences	1	EP10	**Is aware of the proper implementation of the entrusted tasks, both in the field and in the laboratory, taking into account the division of duties in the group.**	**K_K08**
	2	EP11	**Demonstrates readiness for a professional and ethical approach to all tasks related to field research and laboratory processing of the obtained research results.**	**K_K07**

CONTENT	Semester	No. of hours	w tym e-learning
Subject title: **Diatomological workshops**			
Format of instruction: **laboratory**			
1. **OHS and work rules in the diatomology laboratory. optical microscopy.**	3	1	0
2. **Diatoms as a tool in stratigraphic studies. Morphological and biological characteristics of diatoms.**	3	1	0
3. **Methodology of laboratory preparation of microfossils from sediments.**	3	5	0
4. **Diatomological analyses: species identification, qualitative and quantitative analysis.**	3	6	0
5. **Reconstruction of sedimentation conditions and paleoenvironmental changes based on diatomological analysis.**	3	2	0

Modes of delivery	**Power Point presentation, group work, performing experiments and analyses, and summary reports, working with the microscope and specimens**	
Assessment methods		No. of learning outcome from the syllabus
	PREZENTACJA	**EP3,EP7**
	PROJEKT	**EP2,EP6**
	ZAJĘCIA PRAKTYCZNE (WERYFIKACJA POPRZEZ OBSERWACJĘ)	**EP10,EP11,EP4,EP5,EP9**
	Metody i formy weryfikacji efektów uczenia się mogą zostać zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach określonych w Regulaminie Studiów Uniwersytetu Szczecińskiego.	
Grading criteria	**Proper performance of assigned practical tasks, development of results in the form of a written work (report) and multimedia presentation**	
	Grade calculation principles	
	Presentation: partial evaluation at the end of the class. **Written work (project): partial evaluation after the end of the project.** **Practical classes (verification by observation): partial grades for the laboratory work done.** **Final grade: arithmetic average of the presentation, project and completed practical classes.**	

Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	3	warsztaty diatomologiczne		Arytmetyczna	
	3	warsztaty diatomologiczne [laboratorium]	zaliczenie z oceną		

Basic reading	Bąk, M., Witkowski, A., Żelazna-Wieczorek, J., Wojtal, A.Z., Szczepocka, E., Szulc, K., Szulc, B. (2012): Klucz do oznaczania okrzemek w fitobentosie na potrzeby oceny stanu ekologicznego wód powierzchniowych, Biblioteka Monitoringu Środowiska GIOŚ
	Witkowski, A., Lange-Bertalot, H., Metzeltin, D. (2000): Diatom Flora of Marine Coasts I. Iconographia Diatomologica 7, Koeltz Sci. Königstein
Supplementary reading	Smol, J.P., Stoermer, E.F. (2010): The diatoms: applications for the environmental and earth sciences, Cambridge University Press

STUDENT WORKLOAD

	No. of hours	W tym e-learning
Contact hours	**15**	**0**
Participation in test / exam	**1**	**0**
Preparation for contact hours	**10**	**0**
Private reading and studying	**6**	**0**
Participation in tutorials	**4**	**0**
Preparation of project / essay / etc.	**12**	**0**
Preparation for test / exam	**2**	**0**

TOTAL workload	**50**
ECTS credits	**2**

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: **USSPR-O-O-I-S-23/24Z**	
Unit: **Ekologia [moduł]**	
Course title: **ecology (PODSTAWOWE)**	Course code: **SPR38AIJ3446_20S**
Name of field of study: **oceanografia**	
Mode and cycle of study: **first-degree, full - time**	Profile of study: **general academic** / Specialty:
Course / module status **elective**	Language of instruction: **semester: 2 - english language polish language**

Year	Semester	Form of instruction	No. of hours	w tym e-learning	Type of credit	ECTS
1	2	discussion classes	20	0	pg	4
		lecture	20	0	pg	
Total			**40**			**4**

Course / module coordinator	**dr hab. MAŁGORZATA BĄK**
Course instructor	**dr hab. MAŁGORZATA BĄK**
Course / module objectives	**Acquiring by students of knowledge, skills and social competences related to the interaction between organisms and their environment, with research methods used in ecology and with methods of environmental protection. Developing the ability to analyze data relating to various aspects of the above-mentioned interactions**
Prerequisites	**Biological and ecological knowledge obtained at the earlier stages of education**

LEARNING OUTCOMES

Category	No.	Code	Description	Ref. to programme benchmarks
knowledge	1	EP1	**defines the basic concepts and ecological laws relating to the structure and functioning of the Earth's natural environment; identifies basic ecological categories and mechanisms related to the operation of basic ecological laws**	**K_W01 K_W02 K_W04**
	2	EP2	**understands and is able to interpret the processes and phenomena related to the interaction of the environment and groups of living organisms**	**K_W03 K_W05 K_W06**
	3	EP3	**knows the basic methods and forms of protection of the natural environment and biodiversity on Earth**	**K_W09 K_W10**
skills	1	EP4	**uses the literature on ecological processes and phenomena with understanding**	**K_U03 K_U10**
	2	EP5	**searches for information necessary to perform analyzes using the available sources**	**K_U07 K_U10**
	3	EP6	**compares the structure and functioning of various ecosystems on Earth by analyzing data sets relating to specific processes taking place in different ecosystems**	**K_U01 K_U02 K_U07**
	4	EP7	**is able to independently acquire ecological knowledge necessary to interpret the analyzed problems after the guidance of a research tutor**	**K_U13**
social competences	1	EP8	**being aware of the level of their knowledge and skills, they understand the need for continuous professional training and personal development**	**K_K01 K_K02**
	2	EP9	**understands the need to protect the environment and preserve biodiversity**	**K_K03 K_K04 K_K06**

CONTENT	Semester	No. of hours	w tym e-learning
Subject title: **ecology**			
Format of instruction: **lecture**			
1. **null**	2	3	0
2. **null**	2	3	0
3. **null**	2	3	0
4. **null**	2	2	0
5. **null**	2	3	0
6. **null**	2	3	0
7. **null**	2	3	0
Format of instruction: **discussion classes**			
1. **Structure and functioning of terrestrial ecosystems**	2	4	0
2. **Processes and phenomena related to soil protection; Anthropogenic effects on soils. Solid wastes**	2	4	0
3. **Processes and phenomena related to air quality protection. Air pollution and its monitoring**	2	4	0
4. **Processes and phenomena related to protection of surface waters**	2	4	0
5. **Biodiversity, concepts, methods, definitions**	2	4	0

Modes of delivery	**Prezentacja multimedialna na podstawie autorskiego scenariusza wykładu, Wyszukiwanie danych, analiza porównawcza, prezentacja wyników analiz**	
Assessment methods		No. of learning outcome from the syllabus
	KOLOKWIUM	**EP1,EP2,EP3**
	PROJEKT	**EP4,EP5,EP6,EP7**
	ZAJĘCIA PRAKTYCZNE (WERYFIKACJA POPRZEZ OBSERWACJĘ)	**EP8,EP9**
	Metody i formy weryfikacji efektów uczenia się mogą zostać zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach określonych w Regulaminie Studiów Uniwersytetu Szczecińskiego.	
Grading criteria	**Passing grades from individual assignments**	
	Grade calculation principles	
	Arbitral grade given by the coordinator	

Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	2	ecology		Arytmetyczna	
	2	ecology [ćwiczenia]	zaliczenie z oceną		
	2	ecology [wykład]	zaliczenie z oceną		

Basic reading	Krebs Ch. J., (2009): he Experimental Analysis of Distribution and Abundance, University of British Columbia, Vancouver
	Mackenzie A., Ball A.S., Virdee S.R (2001): Instant Notes Ecology, Taylor & Francis
Supplementary reading	

STUDENT WORKLOAD

	No. of hours	W tym e-learning

Contact hours	**40**	**0**
Participation in test / exam	**2**	**0**
Preparation for contact hours	**18**	**0**
Private reading and studying	**10**	**0**
Participation in tutorials	**10**	**0**
Preparation of project / essay / etc.	**10**	**0**
Preparation for test / exam	**10**	**0**
TOTAL workload	**100**	
ECTS credits	**4**	

<table>
<tr><td colspan="4">*Course*: Facies analysis and sequence stratigraphy</td></tr>
<tr><td colspan="4">*Field of study*: Geology</td></tr>
<tr><td>*Class format*</td><td>*Class hours*</td><td>*ECTS*</td><td>*Language*</td></tr>
<tr><td>Lectures</td><td>15</td><td rowspan="2">5</td><td rowspan="2">English</td></tr>
<tr><td>Practicals</td><td>45</td></tr>
<tr><td>*Coordinator:*</td><td colspan="3">Andrzej Osadczuk, Prof.</td></tr>
<tr><td>*Course objectives:*</td><td colspan="3">(1) Presenting the methodology of facies analysis and sequence stratigraphy in the study of sedimentary basins.
(2) Preparing students for practical use of advanced methods of sequence stratigraphy.</td></tr>
<tr><td>*Prerequisites:*</td><td colspan="3">Basic understanding of geology, sedimentology and geophysics</td></tr>
<tr><td colspan="4">*Course content matter*</td></tr>
<tr><td colspan="4">Lectures:
(1) Introduction to facies analysis.
(2) Facies characteristics of sedimentary environments.
(3) Methodology of facies analysis.
(4) Theoretical basis of sequence stratigraphy and its methodology.
(5) Seismic stratigraphy
(6) Depositional system and system tracts

Practicals:
(1) Generation of 3-D facies model
(2) Seismic stratigraphy derived from seismic line analysis
(3) Seismic stratigraphy derived from sediment core analysis
(4) Correlation of seismic and sedimentary facies</td></tr>
<tr><td>*Instruction methods*</td><td colspan="3">Lecture, practical classes</td></tr>
<tr><td>*Course approval format and condition*</td><td colspan="3">Written examination and report submission</td></tr>
<tr><td>*Required reading*</td><td colspan="3">Catuneanu O., 2006. *Principles of Sequence Stratigraphy* Elsevier
Allen P.A., Allen P.R., 1990. *Basin Analysis. Principles & Applications* Blackwell.
Miall A.D., 2010. *Principles of Sedimentary Basin Analysis* Springer
Einsele G., 2000. *Sedimentary Basins. Evolution, Facies and Sediment Budget, 2nd Edition* Springer
Stoker, M.S., Pheasent, J.B., Josenhans, H., 1997. *Seismic methods and interpretation, In: Davies et al. (eds), Glaciated Continental Margins:*</td></tr>
</table>

	An Atlas of Acoustic Images Chapman and Hall

Nazwa przedmiotu: Course name: **Fish diseases**	Kod przedmiotu: Course code:

Nazwa jednostki realizującej przedmiot: Name of the department carrying out the subject: **Institute of Marine ad Environmental Studies**

Rok / semestr: Year / semester: **1/2**	Status przedmiotu: Course status: **obligatory**	Język przedmiotu: Course language; **English**

Rok Year	Semestr Semester	Forma zajęć Form of class	Liczba godzin Number of hours	Forma zaliczenia Form of completion	ECTS
1	2	Wykład Lecture	**15**	**Exam**	
		Ćwiczenia Exercise			
		ćwiczenia laboratoryjne Lab exercise	**15**		
		Konwersatorium discussion session			
		Seminarium seminar			
RAZEM TOTAL					

Prowadzący zajęcia Teacher:	**Prof. dr hab. inż. Wojciech Piasecki**
Cel przedmiotu Course objectives:	**To study the basics of fish diseases**
Wymagania wstępne Prerequisites:	**High-school biology**

EFEKTY UCZENIA SIĘ
LEARNING EFFECTS

Kategoria Category	Opis efektu Effect description	Odniesienie do efektów dla programu Reference to program effects
Wiedza Knowledge	1.	**Knows principal fish pathogens**
	2.	
Umiejętnoci Skills	3.	**Can recognize principal fish pathogens**
	4.	
kompetencje społeczne Social competences	5.	**Can avoid fish pathogens harmful to humans**

TREŚCI PROGRAMOWE PROGRAMME CONTENT

Forma zajęć: Form of instruction: **Lecture**

L.p. No.	Treści Contents	liczba godzin number of hours
1.	**Physiological vs. pathological processes in fish organisms**	**2**
2.	**Introduction to fish immunology**	**2**
3.	**Major pathogens in taxonomic arrangement (Bacteria, viruses)**	**2**
4.	**Major pathogens in taxonomic arrangement (Protista)**	**2**
5.	**Major pathogens in taxonomic arrangement (Flatworms)**	**2**
6.	**Major pathogens in taxonomic arrangement (Roundworms)**	**2**
7.	**Major pathogens in taxonomic arrangement (Crustacea)**	**3**
Forma zajęć: Form of instruction: **Practical class (Lab)**		
8.	**Pathogens in taxonomic arrangement. Specimen examination.**	**6**
9.	**Fish necropsy.**	**6**
10.	**Power points presentations of students**	**3**

Metody kształcenia: Educational methods	**Lecture and practical class**	
Metody weryfikacji efektów uczenia się Verification methods of learning effects		**Nr efektu uczenia się z sylabusa** **Number of effect from the syllabus**
	Exam: effect 1	
	Practical test: effects 3 and 5	
Forma i warunki zaliczenia **Form and conditions of completion**	**Exam: Single-choice test. Passing threshold: 60% of correct answers.** **Practical test: Practical recognition of 60% of pathogen samples.** **Presentation: arbitral grading by the teacher.**	
Literatura podstawowa **Basic literature**	Noga E. (2010) Fish Disease - Diagnosis and Treatment. 2nd edn. Smith, S.A. (Ed.). (2019). Fish Diseases and Medicine (1st ed.).	
Literatura uzupełniająca **Supplementary literature**	Rohde K. (Ed.) (2005): Marine parasitology, CSIRO Publishing,	

NAKŁAD PRACY DOKTORANTA:
WORKLOAD OF STUDENT

	Liczba godzin Number of hours
Zajęcia dydaktyczne Classes	**30**
Przygotowanie się do zajęć Preparation to classes	**15**
Studiowanie literatury Studying literature	**15**

Udział w konsultacjach Participation in consultations	**10**
Przygotowanie projektu / eseju / itp. Preparation of a project / essay / etc.	**20**
Przygotowanie się do egzaminu / zaliczenia Preparation to exam / completion	**10**
Łączny nakład pracy studenta w godz. Total workload of student in hours	**100**
Liczba punktów ECTS Number of ECTS	**5**

<table>
<tr><td colspan="4">*Course*: Geographic information systems</td></tr>
<tr><td colspan="4">*Field of study*: geography</td></tr>
<tr><td>*Class format*</td><td>*Class hours*</td><td>*ECTS*</td><td>*Language*</td></tr>
<tr><td>Practicals</td><td>15</td><td rowspan="2">1</td><td rowspan="2">English</td></tr>
<tr><td>Lecture</td><td></td></tr>
<tr><td>*Coordinator:*</td><td colspan="3">Natalia Sypion-Dutkowska Ph.D.</td></tr>
<tr><td>*Course objectives:*</td><td colspan="3">To familiarize students with the possibilities of geographical information systems (GIS) in the field of visualization and analysis spatial data and examples of applications in this field of knowledge.
To familiarize students with specialized GIS software and the possibilities of its application</td></tr>
<tr><td>*Prerequisites:*</td><td colspan="3">Knowledge of using a Windows computer and completed the course of information technologies</td></tr>
<tr><td colspan="4">*Course content matter*</td></tr>
<tr><td colspan="4">1. Definitions of Geographic Information Systems. Division criteria
2. Data acquisition, introduction, processing and sharing
3. Data models
4. Features, applications and data sources
5. Spatial analysis and visualization of their results
6. Application of vector and raster models
7. Analysis using GIS tools - logical and spatial queries
8. Data collection for the GIS system
9. Attribute data input and database integration
10. Vector models. Screen vectorization of spatial data broken down into layers
thematic
11. Logical and spatial analysis of geodata using our own geodatabase
12. Raster models. Data interpolation methods
13. Modeling in GIS</td></tr>
<tr><td>*Instruction methods*</td><td colspan="3">Individual work at the computer, multimedia presentation, discussion, explanation</td></tr>
<tr><td>*Course approval format and condition*</td><td colspan="3">passing exercises and exam</td></tr>
<tr><td>*Required reading*</td><td colspan="3">Paul A. Longley, Mike Goodchild, et al., 2010, Geographic Information Systems and Science, John Wiley and Sons, USA
Jose Antonio Tenedorio, Rossana Estanqueiro (Eds) 2020, Methods and Applications of Geospatial Technology in Sustainable Urbanism, Business Science Reference.
Ali Mansourian, Petter Pilesjö, Lars Harrie, Ron van Lammeren (Eds) 2020, Geospatial Technologies for All: Selected Papers of the 21st AGILE Conference on Geographic Information Science (Lecture Notes in Geoinformation and Cartography), Springer</td></tr>
</table>

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: **USSPR-Geol-O-I-S-22/23Z**		
Course title: **Geology of the seabed and ocean floor** **(KIERUNKOWE)**		Course code: **SPR81AIJ3446_45S**
Name of field of study: **geologia**		
Mode and cycle of study: **first-degree, full - time**	Profile of study: **general academic**	Specialty:
Course / module status **obligatory**	Language of instruction: **semester: 3 - polish language**	

Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS
				w tym e-learning		
2	3	discussion classes	15	0	pg	4
		laboratory	15	0	pg	
		lecture	30	0	e	
Total			**60**			**4**

Course / module coordinator	**dr hab. DOMINIK ZAWADZKI**
Course instructor	**dr hab. inż. ANDRZEJ OSADCZUK , dr hab. DOMINIK ZAWADZKI**
Course / module objectives	**Familiarize students with issues related to contemporary marine geology, with particular emphasis on understanding the mechanisms of global processes resulting in the formation and evolution of the oceans and the essence of the differences in the structure of the oceanic crust and continental margins, as well as the environmental conditions of marine sedimentation.**
Prerequisites	**Well-established knowledge in the field of physics, chemistry and physical geography at the secondary school level and the basics of geology**

LEARNING OUTCOMES

Category	No.	Code	Description	Ref. to programme benchmarks
knowledge	1	EP1	**The student understands the influence of endogenous factors and the processes shaping the oceanic crust.**	**K_W01 K_W02**
	2	EP2	**Student knows the basic structural forms of the ocean floor.**	**K_W02**
	3	EP3	**Student has knowledge about the processes and mechanisms determining the environmental conditions of marine sedimentation.**	**K_W06**
	4	EP4	**Student knows the basic terms in the field of marine geology, including those relating to the research methods used.**	**K_W03**
	5	EP5	**The student knows the direct and indirect methods of geological research of the seabed and contemporary methods techniques of research and exploration of marine mineral resources.**	**K_W07**
skills	1	EP6	**Using specialized software, he is able to perform spatial analyzes relating to the ocean floor.**	**K_U04**
	2	EP7	**Student is able to graphically visualize various data in order to identify geological events and phenomena occurring in the marine environment.**	**K_U06**
	3	EP8	**Student is able to use the acquired knowledge, geological data and research results to prepare maps and geological sections of the ocean floor.**	**K_U07**

social competences	**1**	**EP9**	**Student is ready to critically assess his knowledge and received content, as well as fulfill social obligations, including co-organizing and initiating activities for the common good, in particular the importance and protection of the marine environment**	**K_K01**
	2	**EP10**	**Student Is ready to cooperate and work in a group, especially at sea and in the laboratory, showing openness, responsibility and rationality in teamwork and observing the principles of ethics and partnership**	**K_K06**

CONTENT	Semester	No. of hours	w tym e-learning
Subject title: **Geology of the seabed and ocean floor**			
Format of instruction: **lecture**			
1. **Provinces of the ocean floor and geomorphic features of the world's oceans.**	3	3	0
2. **From the continental drift hypothesis of Alfred Wegener to the theory of plate tectonics.**	3	4	0
3. **Earth?s Major Plates and plate boundaries (divergent, convergent, transform fault boundaries)**	3	3	0
4. **Geodynamic processes taking place in the Earth and their influence on the formation of the oceans.**	3	4	0
5. **Continental rifting: the birth of a new Ocean Basin (Wilson cycle)**	3	4	0
6. **Structure and genesis of structural forms of the ocean floor and their regional characteristics.**	3	4	0
7. **Active and passive continental margins**	3	4	0
8. **Oceanic crust and marine sediments**	3	4	0
Format of instruction: **discussion classes**			
1. **Objectives and principles of marine geology**	3	2	0
2. **Characteristics of the Earth's Geospheres and the mechanisms of matter differentiation - the extent of the occurrence of mantle plumes and the distribution of hot spots.**	3	2	0
3. **Differentiation and distinctive features of the Earth's crust within lithospheric plates. Plate boundaries and differences in their construction, including structural forms of the ocean floor.**	3	4	0
4. **Wilson cycle and plate tectonics**	3	3	0
5. **Analysis of oceanic crust evolution in selected areas of the Earth (Hawaii, Iceland, Afara triple junction, Pacific Plate and Juan de Fuca, Mediterranean Sea).**	3	4	0
Format of instruction: **laboratory**			
1. **Determination of structural forms of the ocean floor, based on high-resolution bathymetric maps of the bottom, and their distribution. Construction of a fragment of a bathymetric map of the Pacific Ocean using the methods of interpolation and simple extrapolation. Construction of morphological sections of the ocean floor.**	3	3	0
2. **Identification and determination of lithospheric plates boundaries based on geological and geophysical data.**	3	3	0
3. **Lithological character, distribution and classification of oceanic sediments. Genetic classification of selected samples of oceanic sediments based on sedimentological and mineralogical data.**	3	3	0
4. **Characteristics of the bottom of the southern Baltic Sea. Practical use of medium- and large-scale geological maps of the South Baltic.**	3	3	0
5. **Marine deposits and their economic importance. Estimation of placer gold resources within the Australian shelf based on mining sampling data**	3	3	0

Modes of delivery	**Multimedia presentation lecture. Practical classes involving work with geological cartographic materials and analysis of geological data using databases and specialized software.**	
Assessment methods		No. of learning outcome from the syllabus
	EGZAMIN PISEMNY	**EP1,EP2,EP3,EP4,EP5**
	PROJEKT	**EP6,EP7,EP8**
	ZAJĘCIA PRAKTYCZNE (WERYFIKACJA POPRZEZ OBSERWACJĘ)	**EP10,EP6,EP9**
	Metody i formy weryfikacji efektów uczenia się mogą zostać zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach określonych w Regulaminie Studiów Uniwersytetu Szczecińskiego.	

Grading criteria	**Positive assessment of the exam and positive assessment of activity and completed tasks (maps, reports, etc.) performed as part of practical classes.**
	Grade calculation principles
	The course grade is determined by the course coordinator on the basis of component grades (exam, practicals, laboratory). **Written exam: partial grade from lectures.** **Project: partial grade from exercises.** **Practical classes (verification by observation): arithmetic average of grades for completed laboratory tasks.** **Final grade: arithmetic average of the exam, project and practical classes.**

Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	3	geologia dna mórz i oceanów		Arytmetyczna	
	3	geologia dna mórz i oceanów [ćwiczenia]	zaliczenie z oceną		
	3	geologia dna mórz i oceanów [laboratorium]	zaliczenie z oceną		
	3	geologia dna mórz i oceanów [wykład]	egzamin		

Basic reading	Depowski S., Kotlinski R., Rühle E., Szamałek K. (1998): Surowce mineralne mórz i oceanów, Wyd. Nauk. Scholar
	Duxbury A.O., Duxbury A.B., Sverdrup K.A. (2002): Oceany Świata, PWN Warszawa
	Mizerski W., Szamałek K. (2009): Geologia i surowce mineralne oceanów, PWN Warszawa
Supplementary reading	Edward Tarbuck E., Lutgens F., Tasa D. (2017): Earth An Introduction to Physical Geology, Pearson Education Limited
	Erickson J., (2002): Marine Geology: Exploring the New Frontiers of the Ocean. , The Living Earth
	Frisch, Meschede, Blakey, (2011): Plate Tectonics Continental Drift and Mountain Building
	Kotlinski R. (2012): Mapa geodynamiczna oceanów Ziemi 1:25 000 000, IOM, Szczecin
	Kotlinski R. (2012): Mapa makroform rzeźby dna oceanów 1:40 000 000,, IOM, Szczecin
	Kotlinski R. (2012): Mapa osadów oceanicznych 1:40 000 000,, IOM, Szczecin
	MacDougall J.D. (1998): Krótka historia Ziemi, Prószyński i S-ka, Warszawa
	Praca zbiorowa (1995): Atlas Geologiczny Bałtyku Południowego, Panstwowy Instytut Geologiczny, Sopot-Warszawa
	Radomski A., Gasinski N.A. (2004): Elementy oceanologii. Wprowadzenie do środowisk morskich, Wyd. Uniw. Jagielonskiego, Kraków
	Schopf T.J.M. (1987): Paleooceanografia, PWN, Warszawa
	Seibold E., Berger W.H. (1996): The Sea Floor; An Introduction to Marine Geology (3 Edition), Springer- Verlag
	Stanley S.M. (2005): Historia Ziemi, PWN, Warszawa

STUDENT WORKLOAD

	No. of hours	
		W tym e-learning
Contact hours	**60**	**0**
Participation in test / exam	**4**	**0**
Preparation for contact hours	**3**	**0**
Private reading and studying	**10**	**0**
Participation in tutorials	**2**	**0**
Preparation of project / essay / etc.	**15**	**0**
Preparation for test / exam	**6**	**0**
TOTAL workload	**100**	
ECTS credits	**4**	

Course: Geomorphology			
Field of study: Geography			
Class format	*Class hours*	*ECTS*	*Language*
Lectures	15	4	English
Practicals	30		
Coordinator:	Labuz T.A., prof US		
Course objectives:	1. Presentation important processes shaping land forms 2. Description of main land forms and morphological landscapes 3. Explanation of relief form changes 4. Presentation of the methods and problems in geomorphology		
Program content			
1.Objectives and principles of geomorphology 2.Geomorphology research methods 3.The role of endogenous and exogenous processes in formation of Earth's landforms 4.Weathering. Denudation processes and landforms, weathering 5. Slope development, type of slopes 6.Fluvial geomorphology and forms 7.Karst processes and landforms 8.Glacial and periglacial geomorphology 9.Aeolian processes and desert landforms 10.Coastal forms 11. Anthropogenic forms and human impact in landforms, morphological threats			
Educational methods	Lectures, presentations and practical exercises		
Course approval format and condition	Report based on lectures subject. One selected from proposed. Prepared exercises based on practical lectures. Single marks and average evaluation		
Literature	Summerfield M.A., 1991, Global geomorphology Shroder J., 2013. *Treatise on Geomorphology.* Academic Press Bierman P.R; Montgomery D.R., 2020. *Key Concepts in Geomorphology* And other Overview in geomorphology, https://www.thoughtco.com/overview-of-geomorphology-1435326		

<table>
<tr><td colspan="4">*Course*: **Global biosphere changes**</td></tr>
<tr><td colspan="4">*Field of study*: geography</td></tr>
<tr><td>*Class format*</td><td>*Class hours*</td><td>*ECTS*</td><td>*Language*</td></tr>
<tr><td>seminar</td><td>17</td><td rowspan="2">4</td><td rowspan="2">English</td></tr>
<tr><td>field classes</td><td>8</td></tr>
<tr><td>*Coordinator:*</td><td colspan="3">Przemysław Śmietana, Ph.D., D.Sc.</td></tr>
<tr><td>*Course objectives:*</td><td colspan="3">Acquiring knowledge about the causes and effects of global changes and their impact on the formation of the biosphere. Acquiring the skill to conduct data analysis on global biosphere changes and to initiate and co-organize activities related to limiting these changes caused by anthropogenic impact.</td></tr>
<tr><td>*Prerequisites:*</td><td colspan="3">Basic knowledge in the field of biology and geology</td></tr>
<tr><td colspan="4">*Course content matter*</td></tr>
<tr><td colspan="4">1. Evolution of the natural environment in the view of long-term processes and large-scale geological processes
2. Climate changes in the past and their impact on the biosphere
3. Causes of global natural and anthropogenic changes and their impact on changes in the biosphere
4. The impact of human activity on the depletion of the biosphere</td></tr>
<tr><td>*Instruction methods*</td><td colspan="3">seminar lecture with multimedia presentation, study case, analysis of texts with discussion, work in teams.</td></tr>
<tr><td>*Course approval format and conditions*</td><td colspan="3">Course credited on the basis of written work on the issues covered in class</td></tr>
<tr><td>*Required reading*</td><td colspan="3">Poulopoulos S., Inglezakis, V. (Editors) 2016. Environment and Development: Basic Principles, Human Activities, and Environmental Implications. Imprint: Elsevier
Malik A., Grohmann E. (Editors) 2012. Environmental Protection Strategies for Sustainable Development. Imprint: Springer, https://link.springer.com/content/pdf/10.1007%2F978-94-007-1591-2.pdf
Stern P.C., Young O.R., Druckman D. 1992. Global Environmental Change: Understanding the Human Dimensions. The National Academies Press.
Internet, websites</td></tr>
</table>

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: **USSPR-O-O-I-S-23/24Z**	
Unit: **Hydrobiologia [moduł]**	
Course title: **hydrobiology (KIERUNKOWE)**	Course code: **SPR38AIJ3446_6S**
Name of field of study: **oceanografia**	
Mode and cycle of study: **first-degree, full - time**	Profile of study: **general academic** / Specialty:
Course / module status: **elective**	Language of instruction: **semester: 2 - english language polish language**

Year	Semester	Form of instruction	No. of hours	w tym e-learning	Type of credit	ECTS
1	2	discussion classes	20	0	pg	4
		lecture	15	0	e	
		zajęcia terenowe	10	0	p	
Total			**45**			**4**

Course / module coordinator	**dr hab. MAŁGORZATA BĄK**
Course instructor	**dr hab. MAŁGORZATA BĄK**
Course / module objectives	**Acquiring by students of knowledge, skills and social competences related to the specificity of various aquatic environments, the diversity of groups of organisms inhabiting various types of waters, problems of degradation, protection, quality research and economic use of waters.**
Prerequisites	**Completed course in biology and chemistry in the field of Oceanography**

LEARNING OUTCOMES

Category	No.	Code	Description	Ref. to programme benchmarks
knowledge	1	EP1	knows the biology of aquatic organisms and understands their adaptations to life in water; knows the biological characteristics of various aquatic ecosystems.	K_W04
	2	EP2	knows the interdependencies between the abiotic environment and organisms found in water.	K_W02
skills	1	EP3	knows how to use the basic tools and use the basic techniques of hydrobiological research. Can recognize and classify taxa inhabiting the aquatic environment.	K_U05
	2	EP4	can interpret the results of his own simple research and observations and those obtained from other sources and draw conclusions from them, on the basis of which he can identify the type of water ecosystem and its condition.	K_U03 K_U07
	3	EP5	uses with understanding of hydrobiological nomenclature in discussions and statements.	K_U08
social competences	1	EP6	is aware of the need to update his knowledge and skills throughout his life.	K_K01 K_K02

CONTENT	Semester	No. of hours	w tym e-learning
Subject title: **hydrobiology**			
Format of instruction: **lecture**			

1. **The specificity of living conditions in water**	2	2	0
2. **The influence of physical and edaphic factors on biotic phenomena**	2	2	0
3. **Biology of aquatic organisms: buoyancy, movement, streamlined body shape, osmoregulation and ionoregulation**	2	2	0
4. **Anatomical adaptations to life in water**	2	2	0
5. **Ecological formations**	2	1	0
6. **Biological characteristics of the water environment: lakes, dam reservoirs, ponds, rivers, springs and estuaries**	2	2	0
7. **Productivity of ecosystems, habitat diversity**	2	1	0
8. **Taxonomic composition of selected aquatic ecosystems**	2	2	0
9. **Applied hydrobiology: eutrophication, saprobization, acidification**	2	1	0
Format of instruction: **discussion classes**			
1. **Methods for the characterization of the aquatic environment**	2	5	0
2. **Methods of collecting biological data in aquatic environments**	2	10	0
3. **Taxonomic identification of aquatic organisms**	2	5	0
Format of instruction: **zajęcia terenowe**			
1. **Methods of sampling various ecological formations**	2	5	0
2. **Methods of identifying aquatic organisms**	2	5	0

Modes of delivery	**Multimedia presentation based on the author's lecture scenario, practical exercises in the biological laboratory, field classes**	
Assessment methods		No. of learning outcome from the syllabus
	EGZAMIN PISEMNY	**EP1,EP2**
	ZAJĘCIA PRAKTYCZNE (WERYFIKACJA POPRZEZ OBSERWACJĘ)	**EP3,EP4,EP5,EP6**
	Metody i formy weryfikacji efektów uczenia się mogą zostać zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach określonych w Regulaminie Studiów Uniwersytetu Szczecińskiego.	
Grading criteria	**Written exam - a mixed test with open-ended and multiple-choice questions, Completion of exercises and field classes on the basis of correctly completed practical tasks.**	
	Grade calculation principles	
	The grade for the cours is the arithmetic mean of the grades for exercises and the exam.	

Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	2	hydrobiology		Arytmetyczna	
	2	hydrobiology [ćwiczenia]	zaliczenie z oceną		
	2	hydrobiology [zajęcia terenowe]	zaliczenie		
	2	hydrobiology [wykład]	egzamin		

Basic reading	Robert G. Wetzel (2001): Limnology: Lake and River Ecosystems, Elsevier Science
Supplementary reading	

STUDENT WORKLOAD

	No. of hours	
		W tym e-learning
Contact hours	**45**	**0**
Participation in test / exam	**2**	**0**
Preparation for contact hours	**13**	**0**

Private reading and studying	**20**	**0**
Participation in tutorials	**10**	**0**
Preparation of project / essay / etc.	**0**	**0**
Preparation for test / exam	**10**	**0**
TOTAL workload	**100**	
ECTS credits	**4**	

<table>
<tr><td colspan="4">*Course*: Hydrochemistry</td></tr>
<tr><td colspan="4">*Field of study*: Oceanography</td></tr>
<tr><td>*Class format*</td><td>*Class hours*</td><td>*ECTS*</td><td>*Language*</td></tr>
<tr><td>*Lectures*</td><td>15</td><td rowspan="2">5</td><td rowspan="2">English</td></tr>
<tr><td>*Practicals*</td><td>30</td></tr>
<tr><td>*Coordinator:*</td><td colspan="3">Roman Marks, Ph.D, D.Sc.</td></tr>
<tr><td>*Course objectives:*</td><td colspan="3">Students will gain knowledge on: chemical composition of sea water configuration of ionic features, pH and relater ionic balance, chemical composition of surface microlayer, pollution loads and dispersion in sea water, fate of organic pollution in marine ecosystems, mercury fate in sea water and air, general chemical reactions in oceanic system</td></tr>
<tr><td>*Prerequisites:*</td><td colspan="3">Basic knowledge in chemistry, hydrochemistry, physics, biology and ecology</td></tr>
<tr><td colspan="4">*Course content matter*</td></tr>
<tr><td colspan="4">Lectures:
1. Chemical and physical properties of sea water
2. Unique properties of oceanic water
3. Features of transport and exchange of water
4. Oceanic processes of sedimentation
5. Density of sea water. Stratification od water due to density, concept of pycnoclyne. Salinity of water
6. Thermal properties of sea and oceanic waters
7.Geses dissolved in sea water
8. Biogenic matter in oceanic waters
9. Circulatory patterns of ions. Secondary constituents in sea water. Microelements in sea water.
10. Carbonate system of sea water. Sedimentation of carbonaceous matter.
Exercises:
1. Conductivity measurements in sea water
2. Experimental measurements of dissolved oxygen in sea water
3. Experimental measurements of oxygen concentration in air
3. pH measurements
4. Surface microlayer formation and properties
5. Experiments at Coastal Station in Międzyzdroje</td></tr>
<tr><td>*Instruction methods*</td><td colspan="3">Lectures, exercises, field and laboratory experiments</td></tr>
<tr><td>*Course approval format and condition*</td><td colspan="3">Oral exam</td></tr>
<tr><td>*Required reading*</td><td colspan="3">Millero F. J. 2013: Chemical Oceanography, 591.
Marks R., Bełdowska M., 2001: Air-Sea Exchange of Mercury Vapour over the Gulf of Gdańsk and southern Baltic Sea. J. Marine Systems, 27(4), 315-324.</td></tr>
</table>

	Marks R., 2002: Preliminary investigation of mercury saturation in the Baltic Sea winter surface water. The Science of the Total Environment, 229, 227-236. Schneider B., Ceburnis D., Marks R., Munthe J., Petersen G., Sofiev M., 2000: Atmospheric Pb and Cd input into the Baltic Sea: A new estimate based on measurements. Marine Chemistry, Vol. 71, 3-4, 297-307. Urba, A., Kvietkus K., Marks R., 2000: Gas-phase mercury in the atmosphere over the southern Baltic Sea coast. The Science of the Total Environment. Vol. 259, 203-210. Nadstazik A., Marks R., and M., Schulz, 2000: Nitrogen species and macroelements in aerosol over the southern Baltic Sea. Oceanologia, 42(4), 411-424.

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: **USSPR-EZN-O-I-S-22/23Z**	
Unit: **Blok wybieralny XI [moduł]**	
Course title: **Introduction to Bioinformatics (KIERUNKOWE)**	Course code: **SPR207AIJ3446_78S**
Name of field of study: **eksploatacja zasobów naturalnych**	
Mode and cycle of study: **Bachelor degree study, full - time**	Profile of study: **general academic** / Specialty:
Course / module status **elective**	Language of instruction: **semester: 7 - english language**

Year	Semester	Form of instruction	No. of hours	w tym e-learning	Type of credit	ECTS
4	7	laboratory	10	0	pg	3
		lecture	10	0	pg	
Total			**20**			**3**

Course / module coordinator	**dr PRZEMYSŁAW DĄBEK**
Course instructor	**dr ROMAIN GASTINEAU**
Course / module objectives	**Acquiring knowledge and skills related to computer techniques used in molecular biology, public genetic databases, processing and analyzing genetic resources.**
Prerequisites	**Basic knowledge on biology and genetics. Good written and spoken English skills.**

LEARNING OUTCOMES

Category	No.	Code	Description	Ref. to programme benchmarks
knowledge	1	EP1	**Has basic knowledge of the basics of operating systems and programs used in molecular data analysis (bioinformatics) and knows available molecular databases.**	**K_W02 K_W04**
	2	EP2	**Has basic knowledge of molecular biology and genetics, in particular relating to the acquisition and processing of valuable genetic resources**	**K_W10**
	3	EP3	**Knows the basic and advanced techniques and methods of processing genetic data from particularly valuable natural resources.**	**K_W06 K_W08**
skills	1	EP4	**Is able to choose appropriate methods, techniques and tools for obtaining and processing molecular data and genetic resources of selected organisms.**	**K_U06**
social competences	1	EP5	**Is ready to objectively assess the importance of molecular data and bioinformatics techniques in the exploitation of genetic resources**	**K_K01 K_K04**

CONTENT	Semester	No. of hours	w tym e-learning
Subject title: **Introduction to Bioinformatics**			
Format of instruction: **lecture**			
1. **History of bioinfomatics and molecular biology.**	7	2	0
2. **The basics of databases and investigations tools, the pioneers.**	7	2	0
3. **Applications, the principles of molecular barcoding and phylogeny.**	7	2	0

4. **The change of paradigm = Next Generation Sequencing.**	7	2	0
5. **Current challenges and perspectives**	7	2	0
Format of instruction: **laboratory**			
1. **Introduction to LINUX/UNIX or related command-line interfaces.**	7	1	0
2. **GenBank, blast queries, expasy, the basic tools.**	7	1	0
3. **Dealing with a Sanger sequencing.**	7	1	0
4. **Alignment and phylogeny reconstruction.**	7	1	0
5. **Next Generation Sequencing: format of data, quality control.**	7	2	0
6. **Processing short read data, assembly and alignments**	7	2	0
7. **The strengths and issues of long reads.**	7	2	0

Modes of delivery	**Lectures: multimedia presentations. Practical tasks in Windows and LINUX environment or equivalent and genetic databases.**	
Assessment methods		No. of learning outcome from the syllabus
	KOLOKWIUM	**EP1,EP2,EP3,EP4,EP5**
	Metody i formy weryfikacji efektów uczenia się mogą zostać zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach określonych w Regulaminie Studiów Uniwersytetu Szczecińskiego.	
Grading criteria	**Grade from the final test/colloquium from the lecture and laboratory part.**	
	Grade calculation principles	
	The grade in the course is the arithmetic average of the grades from the final test/colloquium in the lecture and laboratory parts.	

Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	7	Introduction to Bioinformatics		Arytmetyczna	
	7	Introduction to Bioinformatics [wykład]	zaliczenie z oceną		
	7	Introduction to Bioinformatics [laboratorium]	zaliczenie z oceną		

Basic reading	Gauthier J., Vincent A.T., Charette S., Derome N. (2018): A brief history of Bioinformatics , Brifings in Bioinformatics
	Haubold B., Boersch-Haubold A. (2018): Bioinformatics for Evolutionary Biologists: a problems approach, Springer
	Lesk A.M. (2019): Introduction to Bioinformatics, Oxford University Press, Londyn
Supplementary reading	Garrels M. (2010): Introduction to Linux a beginner's guide, Fultus Corporation

STUDENT WORKLOAD

	No. of hours	
		W tym e-learning
Contact hours	**20**	**0**
Participation in test / exam	**2**	**0**
Preparation for contact hours	**13**	**0**
Private reading and studying	**15**	**0**
Participation in tutorials	**15**	**0**
Preparation of project / essay / etc.	**0**	**0**
Preparation for test / exam	**10**	**0**

TOTAL workload	**75**
ECTS credits	**3**

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: **USSPR-Geol-O-II-S-23/243**	
Course title: **Land and Marine Sedimentation Environments (KIERUNKOWE)**	Course code: **SPR81AIIJ3446_44S**
Name of field of study: **geologia**	
Mode and cycle of study: **second degree, full - time**	Profile of study: **general academic** / Specialty:
Course / module status: **obligatory**	Language of instruction: **semester: 1 - polish language**

Year	Semester	Form of instruction	No. of hours	w tym e-learning	Type of credit	ECTS
1	1	konwersatorium	20	0	pg	3
Total			**20**			**3**

Course / module coordinator	**mgr JAKUB MILUCH**
Course instructor	**dr PRZEMYSŁAW DĄBEK**
Course / module objectives	**Presenting methods of analyzing present as well as reconstructing past sedimentary environments Preparing students to work with present terrestrial and marine sediments and to analyze environmental changes**
Prerequisites	**Basic understanding of geology, geography, biology, physics and chemistry**

LEARNING OUTCOMES

Category	No.	Code	Description	Ref. to programme benchmarks
knowledge	**1**	**EP1**	**Student has deepened knowledge about physical, chemical and biological conditions that determine sedimentation and accumulation processes.**	**K_W04 K_W05**
	2	**EP4**	**Student understands the principles of functioning and evolution of present natural environments.**	**K_W01**
skills	**1**	**EP8**	**Student is able to present the results of his own research, as well as present and evaluate various opinions and statements in the field of sedimentology**	**K_U09**
social competences	**1**	**EP6**	**Student systematically studies scientific and popular science magazines to update knowledge about sedimentary environments.**	**K_K03**

CONTENT	Semester	No. of hours	w tym e-learning
Subject title: **Land and Marine Sedimentation Environments**			
Format of instruction: **konwersatorium**			
1. **Physical, chemical and biological processes in various sedimentary environments.**	1	4	0
2. **Characteristics of land sedimentary environments and sediments (fluvial, limnic, swampy, glacial, aeolian).**	1	5	0
3. **Characteristics of transitional sedimentary environments and sediments (estuaries, deltas, lagoons, tidal plains).**	1	5	0
4. **Characteristics of marine sedimentary environments and sediments (litorial, sublitoral, hemipelagic, eupelagic)**	1	6	0

Modes of delivery	**A seminar consisting of multimedia presentation combined with the discussion of the topics related to already obtained knowledge from previous geology studies.**

Assessment methods		No. of learning outcome from the syllabus
	KOLOKWIUM	**EP1,EP4,EP6,EP8**
	Metody i formy weryfikacji efektów uczenia się mogą zostać zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach określonych w Regulaminie Studiów Uniwersytetu Szczecińskiego.	
Grading criteria	**Positive grade from the written exam**	
	Grade calculation principles	
	FInal grade corresponds to written exam grade (100%)	

Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	1	lądowe i morskie środowiska sedymentacyjne		Arytmetyczna	
	1	lądowe i morskie środowiska sedymentacyjne [konwersatorium]	zaliczenie z oceną		

Basic reading	Einsele, G. (2000): Sedimentary Basins: Evolution, Facies, and Sediment Budget, Springer Science & Business Media - Studenci otrzymują od prowadzącego pdf'y wybranych i omawianych na zajęciach zagadnień.
	Mike R. Leeder (2011): Sedimentology and Sedimentary Basins: From Turbulence to Tectonics, Wiley-Blackwell - Studenci otrzymują od prowadzącego pdf'y wybranych i omawianych na zajęciach zagadnień.
Supplementary reading	Gradziński R., Kostecka A., Radomski A., Unrug, R.((1986): Zarys sedymentologii, Wydawnictwa Geologiczne
	Huneke H., Mulder T. (2010): Deep-Sea Sediments, Elsevier Science
	Miall, A.D. (2016): Stratigraphy. A modern synthesis., Springer
	Miall, A.D. (2016): The Geology of Fluvial Deposits, Springer
	Miall A.D. (2010): Principles of Sedimentary Basin Analysis, Springer
	Piotr Czubla, Włodzimierz Mizerski, Ewa Świerczewska-Gładysz (2018): Przewodnik do ćwiczeń z geologii, PWN

STUDENT WORKLOAD

	No. of hours	
		W tym e-learning
Contact hours	**20**	**0**
Participation in test / exam	**2**	**0**
Preparation for contact hours	**10**	**0**
Private reading and studying	**18**	**0**
Participation in tutorials	**5**	**0**
Preparation of project / essay / etc.	**0**	**0**
Preparation for test / exam	**20**	**0**
TOTAL workload	**75**	
ECTS credits	**3**	

<table>
<tr><td colspan="4">*Subject*: Landscape genetics</td></tr>
<tr><td colspan="4">*Field of study*: geography, 1st degree, winter semester</td></tr>
<tr><td>*Form of classes*</td><td>*Class hours*</td><td>*ECTS*</td><td>*Language*</td></tr>
<tr><td>Lectures</td><td>10</td><td rowspan="3">4</td><td rowspan="3">English</td></tr>
<tr><td>Laboratory</td><td>20</td></tr>
<tr><td>field trip</td><td>15</td></tr>
<tr><td>*Coordinator:*</td><td colspan="3">dr inż. Jakub Skorupski</td></tr>
<tr><td>*Objectives of the subject:*</td><td colspan="3">familiarization with the theoretical and practical foundations of study on how landscape modification and habitat fragmentation affect organism dispersal and gene flow across the landscape</td></tr>
<tr><td>*Requirement:*</td><td colspan="3">Basics of genetics and ecology</td></tr>
<tr><td colspan="4">*Program content*</td></tr>
<tr><td colspan="4">1. Basics of landscape genetics – terminology and methodology
2. Basics of population genetics. Gene pool vs. population
3. Landscape ecology
4. Metapopulation
5. Linking landscape and genetic data for landscape genetic studies
6. Ecological connectivity
7. Applications of landscape genetics to connectivity research
8. Applications of landscape genetics to nature conservation
9. Application of *in silico* analyses, simulations and modelling in landscape genetics
10. Planning *ex situ* and *in situ* conservation activities based on landscape genetics
11. Current status, future opportunities, and remaining challenges in landscape genetics
12. Guided field trip to a conservation breeding centre for endangered species</td></tr>
<tr><td>*Educational methods*</td><td colspan="3">• lecture
• multimedia presentation
• *in silico* analyses/specialized software
• work in groups
• problem discussion
• case study analysis</td></tr>
<tr><td>*Form and conditions of passing the subject*</td><td colspan="3">Written exam</td></tr>
<tr><td>*Literature*</td><td colspan="3">1. Balkenhol N., Cushman S.A., Storfer A.T., Waits L.P. 2016. Landscape Genetics. John Wiley & Sons Ltd. Hoboken
2. Holderegger R., Gugerli F., Scheidegger C., Taberlet P. 2007. Integrating Population Genetics with Landscape Ecology to Infer Spatio-temporal Processes. In: Kienast F., Wildi O., Ghosh S. (eds). A Changing World. Landscape Series. Vol 8. Springer. Dordrecht
3. Allendorf F.W. 2022 (or previous editions). Conservation and the Genomics of Populations. Oxford University Press. Oxford
4. Frankham R. 2010. Introduction to Conservation Genetics. Cambridge University Press. Cambridge</td></tr>
</table>

	5. Ballou J.D., Briscoe D.A., Frankham R. 2009. A Primer of Conservation Genetics. Cambridge University Press. Cambridge 6. Skorupski J. (ed.) et al. 2017. Conservation genetics in Poland – theory and practice. Polish Society for Conservation Genetics LUTREOLA. Szczecin

<table>
<tr><td colspan="4">*Course*: Marine Environment Protection</td></tr>
<tr><td colspan="4">*Field of study*: Oceanography</td></tr>
<tr><td>*Class format*</td><td>*Class hours*</td><td>*ECTS*</td><td>*Language*</td></tr>
<tr><td>Lectures</td><td>15</td><td rowspan="2">4</td><td rowspan="2">English</td></tr>
<tr><td>Practicals</td><td>15</td></tr>
<tr><td>*Coordinator:*</td><td colspan="3">Teresa Radziejewska, Ph.D., D.Sc.</td></tr>
<tr><td>*Course objectives:*</td><td colspan="3">Raising awareness of natural and anthropogenic hazards and threats to the marine environment
Knowledge of methods and techniques applied to prevent, counteract and mitigate adverse anthropogenic effects in the marine environment</td></tr>
<tr><td>*Prerequisites:*</td><td colspan="3">- Good command of English
- Knowledge of basic ecology
- Knowledge of basic oceanography
- Knowledge of basic principles of environmental management</td></tr>
<tr><td colspan="4">*Course content matter*</td></tr>
<tr><td colspan="4">1. Natural and anthropogenic hazards and threats to the marine environment
2. Retroactive methods and techniques in the marine environment protection
3. Proactive methods and techniques in the marine environment protection
4. Monitoring of the marine environment
5. Environmental Impact Assessment in the marine environment
6. Marine environment protection in the maritime spatial planning</td></tr>
<tr><td>*Instruction methods*</td><td colspan="3">Lectures, interactive class meetings with students' presentations, data mining-based individual assignments</td></tr>
<tr><td>*Course approval format and conditions*</td><td colspan="3">In-class activity; approval of presentations and individual assignments; passing grade at written examination</td></tr>
<tr><td>*Required reading*</td><td colspan="3">- Markus S., Markus T. (eds), 2018. Handbook on Marine Environment Protection. Science, Impacts and Sustainable Management. Springer, Cham
- Snoeijs Leijonmalm, P., Schubert, H., Radziejewska, T. (eds), 2017. Biological Oceanography of the Baltic Sea. Springer, Dordrecht
- Journal articles recommended by the instructor</td></tr>
</table>

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: **USSPR-Geol-O-II-S-23/24Z-GM**						
Course title: **Marine geology (SPECJALNOŚCI / SPECJALIZACJE / MODUŁY SPECJALNOŚCIOWE)**					Course code: **SPR81AIIJ3446_54S**	
Name of field of study: **geologia**						
Mode and cycle of study: **second degree, full - time**		Profile of study: **general academic**			Specialty: **geologia morza**	
Course / module status **obligatory**			Language of instruction: **semester: 1 - polish language**			
Year	**Semester**	**Form of instruction**	**No. of hours**	**w tym e-learning**	**Type of credit**	**ECTS**
1	1	laboratory	15	0	pg	7
		lecture	30	0	e	
		zajęcia terenowe	15	0	pg	
Total			**60**			**7**
Course / module coordinator	**dr hab. DOMINIK ZAWADZKI**					
Course instructor	**dr hab. inż. ANDRZEJ OSADCZUK , dr hab. DOMINIK ZAWADZKI**					
Course / module objectives	**Presenting the methods and sources of data used in marine geology. Presenting the geological history and the evolution of the oceans, ste structure and composition of the oceanic crust.**					
Prerequisites	**Basic understanding of geology, oceanography, physics and chemistry.**					

LEARNING OUTCOMES

Category	**No.**	**Code**	**Description**	Ref. to programme benchmarks
knowledge	**1**	**EP1**	**Student understands the mechanism of action of complex geological processes and their role in shaping the structural forms of the seabed and sediments.**	**K_W01**
	2	**EP2**	**Student has in-depth knowledge in the field of geological sciences, enabling the perception of relationships and dependencies occurring in nature (relations between the spheres of the Geosystem).**	**K_W04**
	3	**EP3**	**Student knows the latest theories and issues related to the development of structural forms, oceanic crust and marine sediments.**	**K_W05**
	4	**EP4**	**The student knows software and IT tools used in marine geology.**	**K_W07**
skills	**1**	**EP5**	**The student is able to apply advanced techniques and tools in the study of structural forms, sediments and their lithofacies differentiation**	**K_U01**
	2	**EP6**	**To describe phenomena and analyze geological data, student uses statistical methods as well as IT techniques and tools used in the study of sedimentary covers**	**K_U05**
	3	**EP7**	**Student collects and interprets data and on their basis formulates appropriate conclusions in marine geology.**	**K_U06**
	4	**EP8**	**Student has the ability to critically analyze and select geological data obtained from various sources**	**K_U07**

social competences	**1**	**EP9**	**The student is ready to properly perform tasks during research cruise, including technical tasks assigned by himself or others.**	**K_K08**
	2	**EP10**	**Student understands the need to systematically study scientific and popular science journals in order to update knowledge in the field of marine geology**	**K_K01 K_K02**
	3	**EP11**	**Student is ready to systematically gain natural knowledge according to its progress and practical applications, especially at the stage of geological research of the sea.**	**K_K03**

CONTENT	Semester	No. of hours	
			w tym e-learning
Subject title: **Marine geology**			
Format of instruction: **lecture**			
1. **Oceans in the Earth's natural system**	1	3	0
2. **Elements of geotectonics**	1	6	0
3. **The Wilson Cycle**	1	3	0
4. **Structure and Composition of the Oceanic Crust**	1	3	0
5. **Passive and active continental margins**	1	4	0
6. **Environmental and physicochemical conditions of marine sedimentation**	1	4	0
7. **Methods and techniques used in geological exploration of the seabed**	1	4	0
8. **Oceanic mineral resources in the light of the UNCLOS.**	1	3	0
Format of instruction: **laboratory**			
1. **Main provinces of the Ocean Floor**	1	2	0
2. **Bathymetric maps and morphological profiles. Construction of a fragment of a bathymetric map of the Pacific Ocean using geostatistical methods**	1	3	0
3. **Plate tectonics: Plate boundaries (divergent, convergent, transform fault boundaries), ophiolite complexes.**	1	2	0
4. **Marine sediments: origins and distribution. Grain size analysis.**	1	3	0
5. **Geological characteristics of the southern Baltic**	1	3	0
6. **Ocean mineral deposits and their economic importance**	1	2	0
Format of instruction: **zajęcia terenowe**			
1. **Methodology of work on a research vessel**	1	2	0
2. **Applications of hydroacoustic equipment in seabed research**	1	3	0
3. **Sampling of the ocean floor**	1	3	0
4. **Recognition of deposits by acoustic methods**	1	2	0
5. **Methodology of working with side scan sonar**	1	2	0
6. **Methodology of working with seismoacoustic devices**	1	3	0

Modes of delivery	**Lectures in the form of a multimedia presentation based on an original scenario,, Field activities: sampling of bottom sediments, measurement of water parameters, etc. from the SNB-1 research vessel, Exercises in the form of laboratory work**

Assessment methods		No. of learning outcome from the syllabus
	EGZAMIN PISEMNY	**EP1,EP10,EP11,EP2,EP3,EP4**
	PROJEKT	**EP5,EP6,EP7,EP8**
	ZAJĘCIA PRAKTYCZNE (WERYFIKACJA POPRZEZ OBSERWACJĘ)	**EP7,EP8,EP9**
	Metody i formy weryfikacji efektów uczenia się mogą zostać zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach określonych w Regulaminie Studiów Uniwersytetu Szczecińskiego.	

Grading criteria	**Practicals - determination of the final grade using the arithmetic average based on partial grades received for the implementation of specific laboratory exercises** **Lectures - written exam** **Field exercises - correctly performed tasks on the SNB-1 research vessel**
	Grade calculation principles
	Exam: grade from the lecture part. **Project: evaluation of the project.** **Practicals (verification by observation): the arithmetic average of the grades for partial tasks carried out in the laboratory and field classes.** **Final grade: the arithmetic mean of the grades from the exam, project, lab assignments and practical classes on the ship.**

Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	1	geologia morza		Arytmetyczna	
	1	geologia morza [zajęcia terenowe]	zaliczenie z oceną		
	1	geologia morza [laboratorium]	zaliczenie z oceną		
	1	geologia morza [wykład]	egzamin		

Basic reading	Depowski S., Kotliński R., Ruehle E., Szamałek K. (1998): Surowce mineralne mórz i oceanów, Wydawnictwo Naukowe Scholar, Warszawa
	Mizerski W., Szamałek K. (2009): Geologia i surowce mineralne oceanów, Wydawnictwo Naukowe PWN, Warszawa
Supplementary reading	Edward Tarbuck E., Lutgens F., Tasa D., (2017): Earth An Introduction to Physical Geology , Pearson Education Limited
	Erickson J., (2002): Marine Geology: Exploring the New Frontiers of the Ocean. The Living Earth, Facts On File, Inc., New York
	Frisch, Meschede, Blakey, (2011): Plate Tectonics Continental Drift and Mountain Building
	Kotliński R. (2011) : Mapa osadów oceanicznych 1:40 000 000, IOM Szczecin
	Kotliński R. (2012) : Mapa form strukturalnych dna oceanów Ziemi 1:25 000 000, IOM Szczecin
	Kotliński R. (2012) : Mapa geodynamiczna oceanów Ziemi 1:25 000 000, IOM Szczecin
	Kotliński R. (2013) : Mapa płyt litosferycznych Ziemi 1:25 000 000, IOM Szczecin
	Mojski J.E. (red.) (1995): Atlas Geologiczny Bałtyku Południowego. Praca zbiorowa.,, Państwowy Instytut Geologiczny, Warszawa
	Osadczuk A. (2017): Badania osadów dennych akwenów śródlądowych z zastosowaniem metod hydroakustycznych,, Wydawnictwo Naukowe Uniwersytetu Szczecińskiego, , Rozprawy i studia, T. (MXXXVIII) 964: 223 s, Szczecin
	Osadczuk A. (2004): Zalew Szczeciński - środowiskowe warunki współczesnej sedymentacji lagunowej, , Wydawnictwa Naukowe Uniwersytetu Szczecińskiego. Rozprawy i studia, T. (DCXXIII) 549: 156 s., Szczecin
	Radomski A., Gasiński M.A. (2004): Elementy oceanologii. Wprowadzenie do środowisk morskich, Wyd. Uniwersytetu Jagiellońskiego
	Schopf T.J.M. (1987): Paleoceanografia, Wydawnictwo Naukowe PWN, Warszawa
	Seibold E., Berger W.H. (1996) : The Sea Floor - an introduction to marine geology, Springer Verlag
	van Andel T. (2001): Nowe spojrzenie na starą planetę. Zmienne oblicze Ziemi, Wydawnictwo Naukowe PWN, Warszawa

STUDENT WORKLOAD

	No. of hours	
		W tym e-learning
Contact hours	**60**	**0**

Participation in test / exam	**10**	**0**
Preparation for contact hours	**10**	**0**
Private reading and studying	**20**	**0**
Participation in tutorials	**5**	**0**
Preparation of project / essay / etc.	**45**	**0**
Preparation for test / exam	**25**	**0**
TOTAL workload	**175**	
ECTS credits	**7**	

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: **USSPR-O-O-I-S-21/22Z-OB**	
Unit: **Ichtiologia i parazytologia morska [moduł]**	
Course title: **marine ichthyology and parasitology (SPECJALNOŚCI / SPECJALIZACJE / MODUŁY SPECJALNOŚCIOWE)**	Course code: **US38AIJ2825_25S**
Name of field of study: **oceanografia**	
Mode and cycle of study: **first-degree, full - time**	Profile of study: **general academic** / Specialty: **oceanografia biologiczna**
Course / module status **elective**	Language of instruction: **semester: 6 - english language**

Year	Semester	Form of instruction	No. of hours	w tym e-learning	Type of credit	ECTS
3	6	discussion classes	10	0	pg	3
		lecture	10	0	pg	
Total			**20**			**3**

Course / module coordinator	**prof. dr hab. WOJCIECH PIASECKI**
Course instructor	**prof. dr hab. WOJCIECH PIASECKI**
Course / module objectives	**Acquiring by students the knowledge, skills and social competencies related to ichthyology and marine parasitology**
Prerequisites	**Knowledge included in the Biology curricula of high school**

LEARNING OUTCOMES

Category	No.	Code	Description	Ref. to programme benchmarks
knowledge	**1**	**EP1**	**Knows and comprehends basic issues of ichthyology and marine parasitology**	**K_W04**
skills	**1**	**EP2**	**Can identify the most common marine fish species and parasite species of marine organisms that are potentially affect human health**	**K_U05**
social competences	**1**	**EP3**	**Understands the need for perpetual learning of ichthyology**	**K_K01 K_K02**

CONTENT	Semester	No. of hours	w tym e-learning
Subject title: **marine ichthyology and parasitology**			
Format of instruction: **lecture**			
1. **Morphology, biology and physiology of fish**	6	2	0
2. **Fisheries vessels and fishing gear**	6	2	0
3. **Mariculture**	6	2	0
4. **Foundations of fish parasitology**	6	3	0
5. **Foundations of marine invertebrates parasitology**	6	1	0
Format of instruction: **discussion classes**			
1. **Foundations of fish systematics.**	6	2	0
2. **Individual powerpoint presentations on selected topics**	6	8	0

Modes of delivery	**Lecture based on PowerPoint presenatation and film., Class exercise based on internet and live or preserved biological specimens.**	
Assessment methods		No. of learning outcome from the syllabus
	KOLOKWIUM	**EP1,EP2,EP3**
	PREZENTACJA	**EP1,EP2,EP3**
	Metody i formy weryfikacji efektów uczenia się mogą zostać zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach określonych w Regulaminie Studiów Uniwersytetu Szczecińskiego.	
Grading criteria	**Passing grade received based on individual presentation**	
	Grade calculation principles	
	Arbitral grade	

Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	6	marine ichthyology and parasitology		Arytmetyczna	
	6	marine ichthyology and parasitology [ćwiczenia]	zaliczenie z oceną		
	6	marine ichthyology and parasitology [wykład]	zaliczenie z oceną		

Basic reading	Helfman G., Collette B.B., Facey D.E., Bowen B.W. (2007): The diversity of fishes: Biology, evolution, and ecology 2nd edition, Willey-Blackwell, Wielka Brytania
	Moyle P.B., Cech J.J.jr. (2004): Fishes: An introduction to ichthyology (5th edition), Pearson
	Rohde K. (red.) (2005): Marine parasitology, CSIRO Publishing , Victoria, Australia
Supplementary reading	

STUDENT WORKLOAD

	No. of hours	
		W tym e-learning
Contact hours	**20**	**0**
Participation in test / exam	**2**	**0**
Preparation for contact hours	**15**	**0**
Private reading and studying	**15**	**0**
Participation in tutorials	**12**	**0**
Preparation of project / essay / etc.	**5**	**0**
Preparation for test / exam	**6**	**0**
TOTAL workload	**75**	
ECTS credits	**3**	

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: **USSPR-Geog-O-II-S-23/24Z-Geoz**						
Course title: **Natural disasters and environmental crises in the Earth history (SPECJALNOŚCI / SPECJALIZACJE / MODUŁY SPECJALNOŚCIOWE)**					Course code: **WN24AIIJ2819_35S**	
Name of field of study: **geografia**						
Mode and cycle of study: **second degree, full - time**		Profile of study: **general academic**			Specialty: **geozagrożenia**	
Course / module status **obligatory**			Language of instruction: **semester: 1 - polish language**			
Year	**Semester**	**Form of instruction**	**No. of hours**		**Type of credit**	**ECTS**
				w tym e-learning		
1	1	laboratory	15	0	pg	4
		lecture	20	0	e	
Total			**35**			**4**
Course / module coordinator	**dr PRZEMYSŁAW DĄBEK**					
Course instructor	**prof. dr hab. RYSZARD BORÓWKA , mgr BARTOSZ BIENIEK**					
Course / module objectives	**Familiarize students with the types of crises and natural disasters, their causes and possibilities of forecasting geological scale. Shaping attitudes of readiness for critical assessment and dissemination of knowledge about natural disasters and environmental crises.**					
Prerequisites	**General knowledge, skills, and social competences in the field of Earth and environmental sciences. Good written and spoken English skills.**					

LEARNING OUTCOMES

Category	**No.**	**Code**	**Description**	Ref. to programme benchmarks
knowledge	**1**	**EP1**	**In-depth knowledge of the mechanisms and causes of the development of natural disasters and environmental crises identified based on geological research**	**K_W02**
	2	**EP2**	**Describes the complex relationships and dependencies occurring in the geographical environment, which are the consequence of the development of various natural disasters**	**K_W03**
	3	**EP3**	**Has knowledge of the global determinants of development and the consequences of some environmental crises**	**K_W05**
	4	**EP5**	**Knows the research methods and tools used in the study of the causes and effects of natural disasters and environmental crises, as well as the geomorphological and geological record of these phenomena**	**K_W08**
skills	**1**	**EP6**	**Uses the theoretical and empirical achievements of physical geography for creative interpretation of natural catastrophic phenomena and natural crises**	**K_U01**
	2	**EP7**	**Analyzes the causes and environmental effects of natural disasters, indicates possible ways to counteract the threats associated with these phenomena**	**K_U03**
	3	**EP9**	**Fluently uses various sources of information on the causes and effects of natural disasters and environmental crises**	**K_U06**
	4	**EP10**	**Is proficient in the use of scientific literature on natural disasters and environmental crises.**	**K_U07**

social competences	**1**	**EP11**	**Is ready to critically evaluate the received content on natural disasters and environmental crises.**	**K_K01**
	2	**EP12**	**Is ready to implement optimal solutions to cognitive problems related to natural disasters and environmental crises**	**K_K02**
	3	**EP13**	**Is ready to promote knowledge about natural disasters and environmental crises, as well as to create a positive image of geography as a scientific discipline dealing with the study of the causes and effects of extreme natural phenomena**	**K_K05**

CONTENT	Semester	No. of hours	
			w tym e-learning
Subject title: **Natural disasters and environmental crises in the Earth history**			
Format of instruction: **lecture**			
1. **Impact events, their age and traces in the form of craters, meteorites and tectites, distribution on the globe.**	1	3	0
2. **Ice Age and Glacial Events in Earth's History - Geological Evidence; concept of Snowball Earth; environmental effects of glacial events.**	1	4	0
3. **Great crises of the organic world (great extinctions) - traces in the geological record, causes.**	1	4	0
4. **"Salt crises" - Permian salt crisis, Messina crisis, causes, environmental effects**	1	3	0
5. **Earthquakes, tsunamis, floods - causes, geological and morphological traces, distribution, effects local, regional and global environmental**	1	4	0
6. **Natural gas explosions (CO2, CH4) - environmental causes and effects**	1	2	0
Format of instruction: **laboratory**			
1. **Analysis of deep sea cores in search of traces of climatic and geological events of regional and global range**	1	5	0
2. **Analysis of the risk of earthquakes and explosive volcanic phenomena and their possible consequences**	1	5	0
3. **The probability of occurrence of tsunamis and floods in different regions of the world**	1	5	0

Modes of delivery	**Informative and problem lecture; case study; event analysis. Reading and discussing scientific literature.**	
Assessment methods		No. of learning outcome from the syllabus
	SPRAWDZIAN	**EP1,EP10,EP2,EP3, EP5,EP6,EP7,EP9**
	ZAJĘCIA PRAKTYCZNE (WERYFIKACJA POPRZEZ OBSERWACJĘ)	**EP11,EP12,EP13**
	Metody i formy weryfikacji efektów uczenia się mogą zostać zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach określonych w Regulaminie Studiów Uniwersytetu Szczecińskiego.	
Grading criteria	**lecture - written exam in the scope of subject content and recommended literature after passing the laboratory laboratory - credit for a positive assessment of individual tasks, passing the final test**	
	Grade calculation principles	
	the arithmetic average of the laboratory and exam grades	

Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	1	katastrofy naturalne i kryzysy środowiskowe w dziejach Ziemi		Arytmetyczna	
	1	katastrofy naturalne i kryzysy środowiskowe w dziejach Ziemi [wykład]	egzamin		
	1	katastrofy naturalne i kryzysy środowiskowe w dziejach Ziemi [laboratorium]	zaliczenie z oceną		

Basic reading	Belcher C.M., Mander L. (2012): Catastrophe: Extraglacial impacts, massive volcanism, and the biosphere. W: The Future of the World's Climate. str. 463-485., Elsevier,
	Borówka R.K. (1996): Ewolucja Ziemi. Wielka Encyklopedia Geografii Świata, tom III, część 3 - Kryzysy i katastrofy w historii Ziemi, , str. 293-349., Wydawnictwo KURPISZ s.c.
	Graniczny M., Mizerski W. (2007): Katastrofy przyrodnicze. str. 1-198., Wydawnictwo Naukowe PWN,
	Ryszard Krzysztof Borówka (2001): Dzieje Ziemi i rozwój życia - jak zmieniał się świat przyrody, str. 194-239, Wydawnictwo Kurpisz S.A., Poznań
Supplementary reading	Cowie J. (2009): Zmiany klimatyczne.Przyczyny, przebieg i skutki dla człowieka. str. 60-96, Wydawnictwo Uniwersytetu Warszawskiego, Warszawa
	O'Connor J.E., Costa J.E. (2004): The World's Largest Floods, past and present: their causes and magnitudes. str. 1-13, US Geological Survey Circular 1254
	Ryan W.B.F., Pittman III W.C., Major C.O., Shimcus K., i inni (1997): An abrupt drowning of teh Black Sea shelf. , str. 119-126, Marine geology 138

STUDENT WORKLOAD

	No. of hours	
		W tym e-learning
Contact hours	**35**	**0**
Participation in test / exam	**2**	**0**
Preparation for contact hours	**8**	**0**
Private reading and studying	**8**	**0**
Participation in tutorials	**22**	**0**
Preparation of project / essay / etc.	**15**	**0**
Preparation for test / exam	**10**	**0**
TOTAL workload	**100**	
ECTS credits	**4**	

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: **USSPR-O-O-I-S-21/22Z-OF**	
Unit: **System ocean-atmosfera [moduł]**	
Course title: **ocean-atmosphere system (SPECJALNOŚCI / SPECJALIZACJE / MODUŁY SPECJALNOŚCIOWE)**	Course code: **US38AIJ3010_8S**
Name of field of study: **oceanografia**	
Mode and cycle of study: **first-degree, full - time**	Profile of study: **general academic** / Specialty: **oceanografia fizyczna**
Course / module status **elective**	Language of instruction: **semester: 5 - english language**

Year	Semester	Form of instruction	No. of hours	w tym e-learning	Type of credit	ECTS
3	5	discussion classes	10	0	pg	3
		lecture	10	0	pg	
Total			**20**			**3**

Course / module coordinator	**dr hab. ROMAN MARKS**
Course instructor	**dr hab. ROMAN MARKS**
Course / module objectives	**Przekazanie wiedzy w zakresie przestrzennej i czasowej zmienności procesów współoddziaływania między Oceanem i Atmosferą, ze szczególnym uwzględnieniem procesów gromadzenia i obiegu energii oraz selekcji i wymiany materii hydrofobowej, ukształtowanie umiejętności dotyczących stosowania podstawowych metod pomiarów oceanograficznych oraz postaw związanych z gotowością podejmowania działań zmierzających do ochrony systemu ocean-atmosfera**
Prerequisites	**Podstawy wiedzy z zakresu fizyki, chemii, biologii i meteorologii**

LEARNING OUTCOMES

Category	No.	Code	Description	Ref. to programme benchmarks
knowledge	1	EP1	Rozumie znaczenia systemu ocean-atmosfera dla obiegu materii oraz ciepła na Ziemi	K_W02
	2	EP2	Rozumie genezę zjawisk i związki między procesami oceanicznymi i atmosferycznymi	K_W01
	3	EP3	Rozumie fizyczne i chemiczne mechanizmy regulujące aktywność biologiczną na Ziemi	K_W05
	4	EP4	Rozumie powiązania wpływające na zachowanie różnorodności środowiska morskiego	K_W04
skills	1	EP5	Przygotowuje, asystuje i wykonuje proste pomiary i eksperymenty	K_U04
	2	EP6	Posługuje sie terminologią stosowaną w oceanografii, hydrologii i meteorologii	K_U08
social competences	1	EP7	Jest gotów do krytycznej oceny swej wiedzy oraz poszukiwania nowych źródeł wiedzy oceanograficznej przez całe życie	K_K01
	2	EP8	Rozumie potrzebę ochroną środowiska wodnego i atmosfery	K_K04
	3	EP9	Rozumie potrzebę równowagi między ochroną i eksploatacją środowiska morskiego i atmosfery	K_K03

CONTENT	Semester	No. of hours	w tym e-learning
Subject title: **ocean-atmosphere system**			

Format of instruction: **lecture**			
1. **Przenoszenie ciepła w systemie Ocean-Atmosfera**	5	1	0
2. **Wiatry nad oceanami**	5	1	0
3. **Prądy oceaniczne**	5	1	0
4. **Aerozole morskie**	5	1	0
5. **Wymiana gazów między morzem i atmosferą**	5	1	0
6. **Przesycenia wody morskiej tlenem**	5	1	0
7. **Wymiana zanieczyszczeń między wodą i powietrzem i procesy bioakumulacji**	5	1	0
8. **Wynoszenie bakterii i wirusów z morza do atmosfery**	5	1	0
9. **Wpływ oceanów na zmniejszenie skutków zmian klimatycznych**	5	1	0
10. **Regulacyjne znaczenie Systemu Ocean-Atmosfera**	5	1	0
Format of instruction: **discussion classes**			
1. **Pomiary energii słonecznej.**	5	1	0
2. **Pokrycie morza pianą morską.**	5	1	0
3. **Pęcherzyki w toni wodnej**	5	1	0
4. **Aerozole morskie**	5	1	0
5. **Gazy rozpuszczone w wodzie morskiej.**	5	1	0
6. **Pęcherzykowa selekcja materii i gazów w wodzie morskiej.**	5	1	0
7. **Pobór próby filmu powierzchniowego z powierzchni wody**	5	1	0
8. **Generacja kropel rozbryzgów podczas deszczu.**	5	1	0
9. **Metody generacji kropel aerozoli z wody morskiej.**	5	1	0
10. **Obserwacja spirali Ekmana w pionowym rozkładzie kierunków wiatru**	5	1	0

Modes of delivery	**Prezentacje multimedialne; omówienie wyników wybranych ekspedycji oceanicznych i polarnych; wykonywanie prostych doświadczeń**	
Assessment methods		No. of learning outcome from the syllabus
	KOLOKWIUM	**EP1,EP2,EP3,EP4**
	PRACA PISEMNA/ ESEJ/ RECENZJA	**EP1,EP2,EP3,EP4,EP5,EP6,EP7,EP8,EP9**
	ZAJĘCIA PRAKTYCZNE (WERYFIKACJA POPRZEZ OBSERWACJĘ)	**EP5,EP6,EP7,EP8,EP9**
	Metody i formy weryfikacji efektów uczenia się mogą zostać zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach określonych w Regulaminie Studiów Uniwersytetu Szczecińskiego.	
Grading criteria	**Wykład: kolokwium ustne z zakresu treści wykładowych Ćwiczenia: cząstkowe oceny z wykonania poszczególnych zadań**	
	Grade calculation principles	
	Średnia arytmetyczna ocen z wykładu i ćwiczeń	

	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
Final grade calculation method	5	ocean-atmosphere system		Arytmetyczna	
	5	ocean-atmosphere system [ćwiczenia]	zaliczenie z oceną		
	5	ocean-atmosphere system [wykład]	zaliczenie z oceną		

Basic reading	Perry A.H., Walker J.M. (1982): System ocean-atmosfera, PWN
	Trzeciak S. (2004): Meteorologia morska z oceanografią, PWN
Supplementary reading	Marks R. (2014): Bubble Rotational Features - Preliminary Investigations , Oceanography: Open Access, 2:128
	Marks R. (2008): Dissolved oxygen supersaturation and its impact on bubble formation in the southern Baltic Sea coastal waters, Hydrology Resear, Vol. 39, No 3ch
	Marks R. (2002): Preliminary investigation of mercury saturation in the Baltic Sea winter surface water, The Science of the Total Environment
	Marks R. (1990): Preliminary investigations on the influence of rain on the production, concentration and vertical distribution of sea salt aerosols, JGR

STUDENT WORKLOAD

	No. of hours	
		W tym e-learning
Contact hours	**20**	**0**
Participation in test / exam	**1**	**0**
Preparation for contact hours	**8**	**0**
Private reading and studying	**6**	**0**
Participation in tutorials	**10**	**0**
Preparation of project / essay / etc.	**20**	**0**
Preparation for test / exam	**10**	**0**
TOTAL workload	**75**	
ECTS credits	**3**	

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: **USSPR-Geol-O-II-S-23/24Z-GM**						
Course title: **Paleoceanography (SPECJALNOŚCI / SPECJALIZACJE / MODUŁY SPECJALNOŚCIOWE)**					Course code: **SPR81AIIJ3446_39S**	
Name of field of study: **geologia**						
Mode and cycle of study: **second degree, full - time**		Profile of study: **general academic**			Specialty: **geologia morza**	
Course / module status **obligatory**			Language of instruction: **semester: 2 - polish language**			
Year	**Semester**	**Form of instruction**	**No. of hours**	**w tym e-learning**	**Type of credit**	**ECTS**
1	2	konwersatorium	45	0	e	4
		laboratory	15	0	pg	
Total			**60**			**4**
Course / module coordinator	**dr PRZEMYSŁAW DĄBEK**					
Course instructor	**dr PRZEMYSŁAW DĄBEK**					
Course / module objectives	**Familiarize students with the formation and evolution of the oceans, present history and function of the ocean-atmosphere system in the geological past and the role of oceans in regulating the Earth's climate in the past and nowadays.**					
Prerequisites	**Basic knowledge and skills related to geology, marine geology, geochemistry, biostratigraphy. Good spoken and written English skills.**					

LEARNING OUTCOMES

Category	No.	Code	Description	Ref. to programme benchmarks
knowledge	1	EP1	Understands the mechanism of action of complex geological processes and their role in the formation of the Earth	K_W01
	2	EP2	In research and practice, knows and understands the principle of strict, based on empirical data, interpretation of complex geological phenomena and processes	K_W02
	3	EP3	Has in-depth knowledge of the earth sciences, which allows to see the relationships and dependencies in the nature	K_W04
	4	EP4	Knows the latest theories and issues in the Earth sciences and their relationships with other fields and disciplines of science	K_W05
skills	1	EP5	Has the ability to develop and present selected issues in the field of geology and demonstrates the ability to critically analyze and select data, especially from electronic sources	K_U07
	2	EP7	Zbiera i interpretuje dane empiryczne i na ich podstawie formułuje odpowiednie wnioski dotyczące procesów geologicznych	K_U07
	3	EP8	Can present the results of his/her own research and start a scientific discussion with specialists in the selected discipline of geological sciences	K_U09 K_U10
social competences	1	EP11	Is ready to systematically study scientific and popular science magazines in order to update geological knowledge	K_K03

CONTENT	Semester	No. of hours	w tym e-learning
Subject title: **Paleoceanography**			
Format of instruction: **konwersatorium**			
1. **Purpose and subject of paleoceanographic research. History of the development of paleoceanography. Material for research. International ocean drilling programs.**	2	3	0
2. **Formation of the lithosphere, hydrosphere and atmosphere. Biochemical basis of life on Earth.**	2	5	0
3. **Overview of groups of microorganisms used in geological reconstructions of the oceans and seas.**	2	4	0
4. **Dating marine sediments. Geochemical cycles in the ocean. Application of selected isotopes in paleoceanography.**	2	4	0
5. **Sea and ocean temperature reconstructions.**	2	4	0
6. **Reconstructions of changes in the productivity of seas and oceans.**	2	4	0
7. **Ocean basin depth fluctuations.**	2	3	0
8. **Reconstruction of salinity and water chemistry.**	2	3	0
9. **Paleocurrents, paleotides, paleostorms, oceanic circulation.**	2	4	0
10. **Fossil DNA and the molecular clock. Biomarkers in sediments.**	2	4	0
11. **The main climatic and geological events in the Cenozoic.**	2	4	0
12. **Multiproxy analyzes in environmental reconstructions of the Baltic Sea sediments.**	2	3	0
Format of instruction: **laboratory**			
1. **Sampling of sediments from ocean cores. Laboratory sample preparation.**	2	4	0
2. **Palaeoceanographic databases. Searching for information on cores from ocean drilling. Sample ordering process with DSDP/ODP/IODP. Analysis of important palaeoceanographic phenomena of the Cenozoic.**	2	3	0
3. **Biostratigraphic data. Performing the depth-age model and the linear sedimentation rate (LSR).**	2	4	0
4. **Determination of water paleotemperature using the UK37 and TEX86 methods.**	2	4	0

Modes of delivery	**Lecture, Microscopic analysis in lab, Work on computers, data collection and discussion based on prepared materials**	
Assessment methods		No. of learning outcome from the syllabus
	EGZAMIN PISEMNY	**EP1,EP3,EP4**
	PROJEKT	**EP2,EP5,EP7**
	ZAJĘCIA PRAKTYCZNE (WERYFIKACJA POPRZEZ OBSERWACJĘ)	**EP11,EP8**
	Metody i formy weryfikacji efektów uczenia się mogą zostać zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach określonych w Regulaminie Studiów Uniwersytetu Szczecińskiego.	
Grading criteria	**Positive grade in the exam covering knowledge from lectures and basic literature. Completion of the laboratory based on the implementation of practical tasks, correctly performed all exercises.**	
	Grade calculation principles	
	The final grade for the entire course is a weighted average: Written exam: partial grade from the lecture part (0.6). Project: partial grade from laboratory tasks (0.2). Practical classes (verification by observation): arithmetic mean determined from partial grades for work done in the laboratory (0.2).	

Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	2	paleooceanografia		Ważona	
	2	paleooceanografia [konwersatorium]	egzamin		0,60
	2	paleooceanografia [laboratorium]	zaliczenie z oceną		0,40

Basic reading	Fisher, G. & Wefer, G. (Ed.). (1999): Use of proxies in paleoceanography: Examples from the South Atlantic. , Springer, Studenci otrzymują od prowadzącego pdf'y wybranych i omawianych na zajęciach zagadnień.
	Hillaire-Marcel, C. & de Vernal, A. (Ed.). (2007): Proxies in late Cenozoic paleoceanography., Elsevier, Studenci otrzymują od prowadzącego pdf'y wybranych i omawianych na zajęciach zagadnień.
	Schopf, T.J.M. (1987): Paleoceanografia, Wydawnictwo Naukowe PWN
	Seibold, E. & Berger, W. (Ed.). (2017): The sea floor: an introduction to marine geology., Springer, Studenci otrzymują od prowadzącego pdf'y wybranych i omawianych na zajęciach zagadnień.
	van Andel, T.H. (1997): Nowe spojrzenie na starą planetę. Zmienne oblicze Ziemi., PWN
Supplementary reading	Duxbury, A.O., Duxbury, A.B., Sverdrup, K.A. (2002): Oceany Świata, Wydawnictwo Naukowe PWN
	Haq. B.U & Boresma, A. (Ed.). (1978): Introduction to marine micropaleontology. , Elsevier
	Selley R.C., Cocks R.,Plimer I. (Ed.) (2005): Encyclopedia of Geology, Elsevier
	Stanley, S.M. (2002): Historia Ziemi, Wydawnictwo Naukowe PWN

STUDENT WORKLOAD

	No. of hours	
		W tym e-learning
Contact hours	**60**	**0**
Participation in test / exam	**2**	**0**
Preparation for contact hours	**4**	**0**
Private reading and studying	**12**	**0**
Participation in tutorials	**4**	**0**
Preparation of project / essay / etc.	**7**	**0**
Preparation for test / exam	**11**	**0**
TOTAL workload	**100**	
ECTS credits	**4**	

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: **USSPR-O-O-I-S-22/23Z**		
Course title: **Physical Oceanography (KIERUNKOWE)**		Course code: **SPR38AIJ3446_5S**
Name of field of study: **oceanografia**		
Mode and cycle of study: **first-degree, full - time**	Profile of study: **general academic**	Specialty:
Course / module status **obligatory**	Language of instruction: **semester: 4 - polish language**	

Year	Semester	Form of instruction	No. of hours	w tym e-learning	Type of credit	ECTS
2	4	discussion classes	30	0	pg	7
		lecture	30	0	e	
		zajęcia terenowe	15	0	pg	
Total			**75**			**7**

Course / module coordinator	**dr hab. ROMAN MARKS**
Course instructor	**dr hab. ROMAN MARKS**
Course / module objectives	**Acquisition by students of knowledge, skills and social competences related to the basic physical phenomena and processes in the oceans and their geographical diversity and measurement techniques.**
Prerequisites	**Basic knowledge in mathematics, physics and chemistry**

LEARNING OUTCOMES

Category	No.	Code	Description	Ref. to programme benchmarks
knowledge	**1**	**EP1**	**Student knows the basic concepts, phenomena and physical processes occurring in the marine environment, is able to describe and interpret them.**	**K_W01**
	2	**EP2**	**Student has knowledge of the basic techniques and instruments used in physical oceanography and understands the principles of their operation.**	**K_W09**
skills	**1**	**EP3**	**Student is able to perform measurements of currents and physicochemical properties of water and interpret the obtained results.**	**K_U04**
	2	**EP4**	**Student is able to measure the physical and chemical parameters of sea water and interpret the results**	**K_U04**
	3	**EP5**	**Student demonstrates the ability to draw conclusions based on the synthesis of information from various sources (oceanographic databases, weather maps, waves, messages, forecasts and warnings) and data obtained as a result of simple research.**	**K_U09**
	4	**EP6**	**In discussions with academic supervisors, the student demonstrates the ability to use the language appropriate for oceanography, in particular terminology and nomenclature related to physical oceanography.**	**K_U08**
social competences	**1**	**EP7**	**He is ready to spread knowledge in the field of oceanographic research and ocean resource management in society and to use it for practical or cognitive purposes.**	**K_K07**

CONTENT	Semester	No. of hours	
			w tym e-learning
Subject title: **Physical Oceanography**			
Format of instruction: **lecture**			
1. **Place of physical oceanography in the structure of marine sciences. Earth's hipso and bathygraphic curve. Forms of the ocean and sea bottom.**	4	2	0
2. **Physical properties of sea water: salinity, temperature and density of ocean water, thermodynamic transformations and their impact on sea water density, equation of state of sea water.**	4	4	0
3. **Major features of water structure, hydrological fronts, water masses, formation and division of water masses. Sea water mixing processes.**	4	4	0
4. **Forces causing and modifying the movement of water masses, equations of motion.**	4	3	0
5. **Sea currents and their classification.**	4	5	0
6. **General water circulation system in seas and oceans. The influence of currents on the variability of physico-chemical features of sea basins and climate.**	4	2	0
7. **Regional divisions of seas and oceans, regional physical and chemical characteristics.**	4	2	0
8. **Wind wave - theories of the process of wave development and transformation.**	4	2	0
9. **Sejsze, fale baryczne, tsunami. Zjawisko pływów.**	4	2	0
10. **Ice cover in the seas. Types of ice, sea ice cover, icing phenomena. The influence of sea ice on the physico-chemical characteristics of sea basins and climate.**	4	2	0
11. **The Baltic Sea as an example of a shelf sea.**	4	2	0
Format of instruction: **discussion classes**			
1. **Thermometers, pyrometers, thermal platforms**	4	5	0
2. **Dissolved oxygen meters, pH-meters, conductivity meters**	4	5	0
3. **Photography recording of rotational features generated around bubbles rising in sea water**	4	5	0
4. **Recording of whitecap cover**	4	5	0
5. **Photography recording of rotational features generated around bubbles rising in sea water**	4	5	0
6. **Sampling and analyzes of surface microlayer**	4	5	0
Format of instruction: **zajęcia terenowe**			
1. **Measurements of wind waves parameters in the coastal zone**	4	3	0
2. **Observation of wind wave transformation in the coastal zone**	4	3	0
3. **Photography recording of whitecap cover in the coastal water**	4	3	0
4. **Measurements of the coastal currents**	4	3	0
5. **null**	4	3	0

Modes of delivery	**Lectures with the use of multimedia presentations., Classes: independent or team performance of written tasks (analysis of maps and literature, Internet information, calculations, use of nomograms, formulas) and presentation of a selected paper.**	
Assessment methods		No. of learning outcome from the syllabus
	EGZAMIN USTNY	**EP1**
	PREZENTACJA	
	Metody i formy weryfikacji efektów uczenia się mogą zostać zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach określonych w Regulaminie Studiów Uniwersytetu Szczecińskiego.	
Grading criteria	**Lectures: oral exam**	
	Grade calculation principles	
	The final grade of the subject is the arithmetic average of the grades from the partial questions.	

	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
Final grade calculation method	4	oceanografia fizyczna		Arytmetyczna	
	4	oceanografia fizyczna [wykład]	egzamin		
	4	oceanografia fizyczna [ćwiczenia]	zaliczenie z oceną		
	4	oceanografia fizyczna [zajęcia terenowe]	zaliczenie z oceną		

Basic reading	Druet Cz. (2000): Dynamika morza, Wyd. Morskie , Gdańsk
	Duxbury A., Duxbury A.B., Sverdrup K.A. (2002): Oceany świata, Wyd. Naukowe PWN, Warszawa
	Stewart R. (2005): Introduction to Physical Oceanography, Department of Oceanography, Texas A&M University, oceanworld.tamu.edu/ocean410/ocng410_text_book.htm
	Talley L.D., Pickard G.L., Emery W.J., Swift J.H. (2011): Descriptive Physical Oceanography: An Introduction (Sixth Edition), Elsevier, Boston
	Tomczak M. and Godfrey J.S (2003): Regional Oceanography: an Introduction www.es.flinders.edu.au/~mattom/regoc/, Daya Publishing House, www.es.flinders.edu.au/~mattom/index2.html
Supplementary reading	Holec M., Wiśniewski B. (1983): Zarys oceanografii, cz. I, Statyka morza. , Wyd. WSMW, Gdynia
	Majewski A. (1992): Oceany i morza, Wyd. Naukowe PWN, Warszawa
	Wiśniewski B., Holec M. (1983): Zarys oceanografii, cz. II, Dynamika morza., Wyd. WSMW, Gdynia
	Zakrzewski W. (1983): Lody na morzach, Wyd. Morskie, Gdańsk

STUDENT WORKLOAD

	No. of hours	
		W tym e-learning
Contact hours	**75**	**0**
Participation in test / exam	**3**	**0**
Preparation for contact hours	**12**	**0**
Private reading and studying	**25**	**0**
Participation in tutorials	**5**	**0**
Preparation of project / essay / etc.	**25**	**0**
Preparation for test / exam	**30**	**0**
TOTAL workload	**175**	
ECTS credits	**7**	

<table>
<tr><td colspan="4">*Course:* Regional and local development</td></tr>
<tr><td colspan="4">*Field of study:* geography</td></tr>
<tr><td>*Class format*</td><td>*Class hours*</td><td>*ECTS*</td><td>*Language*</td></tr>
<tr><td>*Lectures*</td><td>*10*</td><td rowspan="2">*2*</td><td rowspan="2">*English*</td></tr>
<tr><td>*Seminar*</td><td>*20*</td></tr>
<tr><td>*Coordinator:*</td><td colspan="3">*Prof. Marek Dutkowski, Ph.D., D.Sc.*</td></tr>
<tr><td>*Course objectives:*</td><td colspan="3">*1*. Getting to know the terminology of regional and local development
2. Getting to know the main theories of regional and local development - its determinants and factors
3. Understanding the economic, social and spatial effects of the diversification of regional and local development processes
4. Acquiring the ability to analyze and interpret phenomena and processes of regional and local development in spatial terms
5. Acquiring the ability to carry out a regional or local development analysis in a case study</td></tr>
<tr><td>*Prerequisites:*</td><td colspan="3">Basic knowledge of the economy, society, and basic skills in the subject of geography and statistics at the secondary school level.</td></tr>
<tr><td colspan="4">*Course content matter*</td></tr>
<tr><td colspan="4">1. Regional and local development - definition and characteristics of the phenomenon
2. Theories of regional and local development
3. Regional and local development - a synthetic approach
4. Methods of analysis and interpretation of spatial differentiation of regional and local development
5. 5. Methods of analysis and interpretation of socio-economic development in the scale of a region, city or commune.</td></tr>
<tr><td>*Instruction methods*</td><td colspan="3">1. Seminar lecture (10 hours).
2. Own desktop work under the guidance of the course instructor (20 hours).</td></tr>
<tr><td>*Course approval format and condition*</td><td colspan="3">1. Preparation of two essays: (1) on the spatial differentiation of development processes on a national or regional scale, (2) on the conditions and factors of the course of socio-economic development for the winning region, city or commune (5 points to obtain for each essay: analysis – 2; interpretation – 2; style, editing, charts and maps, literature).
2. Pass a 10-question multiple choice test (10 points to obtain).
3. The final grade is based on the number of points obtained according to the rule: 20-19 points - 5.0; 17-18 points - 4.5; 15-16</td></tr>
</table>

	points - 4.0; 13-14 points - 3.5; 11-12 points - 3.0. Less than 11 points - 2.0 failure to pass the course.
Required reading	Pike A., Rodríguez-Pose A., Tomaney J., 2016, Local and Regional Development, Routledge. *Other literature, mainly digital, will be provided or indicated by the course instructor.*

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: **USSPR-O-O-I-S-21/22Z-OF**	
Unit: **Teledetekcja środowiska morskiego [moduł]**	
Course title: **remote sensing of marine environment (SPECJALNOŚCI / SPECJALIZACJE / MODUŁY SPECJALNOŚCIOWE)**	Course code: **US38AIJ2826_12S**
Name of field of study: **oceanografia**	
Mode and cycle of study: **first-degree, full - time**	Profile of study: **general academic** / Specialty: **oceanografia fizyczna**
Course / module status **elective**	Language of instruction: **semester: 6 - english language**

Year	Semester	Form of instruction	No. of hours	w tym e-learning	Type of credit	ECTS
3	6	laboratory	15	0	pg	4
		lecture	10	0	e	
Total			**25**			**4**

Course / module coordinator	**dr hab. JOANNA DUDZIŃSKA-NOWAK**
Course instructor	**dr hab. JOANNA DUDZIŃSKA-NOWAK**
Course / module objectives	**Acquisition of knowledge, skills and social competences related to the use of remote sensing methods to investigate the seas and the marine coastal zone**
Prerequisites	**Completed remote sensing course**

LEARNING OUTCOMES

Category	No.	Code	Description	Ref. to programme benchmarks
knowledge	1	EP1	Knows the basic statistical and mathematical methods and uses them in the interpretation of phenomena and processes occurring in the marine environment	K_W08
	2	EP2	In the interpretation of phenomena and processes occurring in the marine environment, he relies on the analysis of remote sensing data, fully understanding the importance of statistical and mathematical methods	K_W09
	3	EP3	Has knowledge in the field of statistics and computer science at a level that allows describing the phenomena and processes occurring in the marine environment as a result of the interpretation of remote sensing data	K_W06
skills	1	EP4	Is able to get access the remote sensing data on the marine environment, using available sources, including the Internet	K_U07
	2	EP5	Uses mathematical methods in the description and interpretation of oceanographic phenomena, applies algorithms and IT techniques for remote sensing analyzes of the marine environment	K_U07
	3	EP6	In the interpretation of phenomena occurring in the marine environment, demonstrates the ability to draw conclusions based on the analysis of remote sensing data in combination with data obtained from other sources	K_U09

social competences	**1**	**EP7**	**Understands the need to constantly supplement knowledge both in the field of new methods of obtaining remote sensing data, as well as the method of processing and interpreting these data**	**K_K02**

CONTENT	Semester	No. of hours	
			w tym e-learning
Subject title: **remote sensing of marine environment**			
Format of instruction: **lecture**			
1. **Overview of Earth's satellite systems**	6	1	0
2. **Characteristics of remote sensing satellite equipment used in sea research**	6	1	0
3. **Characteristics of remote sensing aerial equipment used in research of the coastal zone**	6	2	0
4. **Selection of remote sensing methods and systems depending on the studied phenomena of the marine environment**	6	2	0
5. **Discussion of examples of remote sensing applications for marine research**	6	2	0
6. **Discussion of examples of remote sensing applications for the coastal zone investigation.**	6	2	0
Format of instruction: **laboratory**			
1. **Remote sensing characteristics of satellite equipment used in sea and coastal research**	6	1	0
2. **Satellite data sources and their availability**	6	2	0
3. **Satellite and aerial data processing**	6	2	0
4. **Analysis of the distribution of selected parameters of the marine environment on satellite images**	6	2	0
5. **Ice phenomena in the coastal zone on satellite and aerial photos**	6	2	0
6. **The morphology of the bottom of the coastal zone on aerial photographs**	6	2	0
7. **Oil spills in aerial photos**	6	2	0
8. **Waves in the coastal zone in aerial photos**	6	2	0

Modes of delivery	**Multimedia presentation, exercises related to the discussion, independent work at the computer, written work, lecture**	
Assessment methods		No. of learning outcome from the syllabus
	EGZAMIN PISEMNY	**EP1,EP2,EP3**
	KOLOKWIUM	**EP6,EP7**
	PRACA PISEMNA/ ESEJ/ RECENZJA	**EP2,EP4,EP6**
	ZAJĘCIA PRAKTYCZNE (WERYFIKACJA POPRZEZ OBSERWACJĘ)	**EP4,EP5**
	Metody i formy weryfikacji efektów uczenia się mogą zostać zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach określonych w Regulaminie Studiów Uniwersytetu Szczecińskiego.	
Grading criteria	**Lectures: Positive assessment of the written exam** **Labs: Passing a written assignment and all the work done in class, Passing a semester colloquium**	
	Grade calculation principles	
	The course grade is the arithmetic average of the lecture and laboratory grades.	

Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	6	remote sensing of marine environment		Arytmetyczna	
	6	remote sensing of marine environment [wykład]	egzamin		
	6	remote sensing of marine environment [laboratorium]	zaliczenie z oceną		

Basic reading	Furmańczyk, K. (1994): Współczesny rozwój strefy brzegowej morza bezpływowego w świetle badań teledetekcyjnych południowych wybrzeży Bałtyku, Wyd. Uniwersytetu Szczecińskiego
	Robinson, I.S. (1985): Satellite oceanography, Ellis Horwood
	Sabins F.F. (1987): Remote Sensing - Principles and Applications, Jon Wiley and Sons
Supplementary reading	Meidment, D.R. (2002): Arc Hydro: GIS for Water Resources, Esri Press
	Seelye, M. (2004): An introduction to Ocean Remote Sensing, Cambridge University Press

STUDENT WORKLOAD

	No. of hours	
		W tym e-learning
Contact hours	**25**	**0**
Participation in test / exam	**2**	**0**
Preparation for contact hours	**15**	**0**
Private reading and studying	**15**	**0**
Participation in tutorials	**10**	**0**
Preparation of project / essay / etc.	**13**	**0**
Preparation for test / exam	**20**	**0**
TOTAL workload	**100**	
ECTS credits	**4**	

<table>
<tr><td colspan="4">*Subject*: Restoration ecology</td></tr>
<tr><td colspan="4">*Field of study*: exploitation of natural resources, 1st degree, winter semester</td></tr>
<tr><td>*Form of classes*</td><td>*Class hours*</td><td>*ECTS*</td><td>*Language*</td></tr>
<tr><td>lectures</td><td>10</td><td rowspan="3">4</td><td rowspan="3">English</td></tr>
<tr><td>laboratory</td><td>20</td></tr>
<tr><td>field trip</td><td>15</td></tr>
<tr><td>*Coordinator:*</td><td colspan="3">dr inż. Jakub Skorupski</td></tr>
<tr><td>*Objectives of the subject:*</td><td colspan="3">familiarization with theories, methods and concepts of scientific foundations of ecological restoration</td></tr>
<tr><td>*Requirement:*</td><td colspan="3">Basics of general biology and ecology</td></tr>
<tr><td colspan="4">*Program content*</td></tr>
<tr><td colspan="4">1. Introduction to restoration ecology – definition, terminology, methods and concepts
2. Scientific basis of restoration – recultivation, renaturization, renaturalization, revitalisation, restitution, reintroduction and rewilding
3. Restoration ecology in action – erosion control, daylighting streams, counteracting to eutrophication
4. Restoration ecology in action – revegetation and reforestation
5. Restoration ecology in action – native species reintroduction
6. Restoration ecology in action – management of non-indigenous species' populations
7. Restoration ecology in action – habitats restoration
8. Green and blue infrastructure. "Betonosis". Ecological connectivity
9. Restoration ecology and sustainable development concept. Socio-economic aspects of ecological restoration
10. Guided field trip – restoration in action</td></tr>
<tr><td>*Educational methods*</td><td colspan="3">• lecture
• multimedia presentation
• work in groups
• problem discussion
• case study analysis</td></tr>
<tr><td>*Form and conditions of passing the subject*</td><td colspan="3">Written exam</td></tr>
<tr><td>*Literature*</td><td colspan="3">1. Fryxell J.M., Sinclair A.R.E., Caughley G. 2014 (or previous editions). Wildlife Ecology, Conservation, and Management. Wiley-Blackwell. Hoboken
2. Lovejoy T.E., Hannah L., Wilson E.O. 2019. Biodiversity and Climate Change: Transforming the Biosphere. Yale University Press. London
3. Holl K. 2020. Primer of Ecological Restoration. Island Press. Washington</td></tr>
</table>

	4. Skorupski J. (ed.) et al. 2017. Invasive Alien Species – identification of threats to protect biodiversity. Polish Society for Conservation Genetics LUTREOLA. Szczecin 5. Restoration Ecology (Wiley) 6. Global Ecology and Conservation (Elsevier)

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: **USSPR-Geol-O-I-S-22/23Z**		
Course title: **Sedimentology** **(KIERUNKOWE)**		Course code: **SPR81AIJ3446_71S**
Name of field of study: **geologia**		
Mode and cycle of study: **first-degree, full - time**	Profile of study: **general academic**	Specialty:
Course / module status **obligatory**	Language of instruction: **semester: 3 - polish language**	

Year	Semester	Form of instruction	No. of hours	w tym e-learning	Type of credit	ECTS
2	3	discussion classes	10	0	pg	4
		laboratory	15	0	pg	
		lecture	30	0	e	
Total			**55**			**4**

Course / module coordinator	**dr hab. DOMINIK ZAWADZKI**
Course instructor	**dr inż. KRYSTYNA OSADCZUK , dr hab. DOMINIK ZAWADZKI**
Course / module objectives	**To familiarize students with the knowledge of: the origin and diversity of sediments and sedimentary rocks, sedimentation processes in marine and land sedimentary environments and research methods used in sedimentology. Teaching to recognize types of sediments and describe their structural and textural features and to draw environmental conclusions based on this information.**
Prerequisites	**Advanced knowledge of physics and chemistry as well as physical geology, mineralogy and petrography acquired during the earlier years of study.**

LEARNING OUTCOMES

Category	No.	Code	Description	Ref. to programme benchmarks
knowledge	**1**	**EP1**	**The student understands the essence of physicochemical processes related to sedimentation processes.**	**K_W06**
	2	**EP2**	**The student has knowledge of the environmental conditions of sedimentation processes, including the importance of climate, local meteorological and hydrological conditions.**	**K_W04**
	3	**EP3**	**The student knows the terminology used in sedimentology and the types of sediments formed in various marine and land environments.**	**K_W03**
	4	**EP4**	**The student knows the advanced methods used in the study of sedimentary rocks.**	**K_W07**
	5	**EP9**	**The student knows and understands rules of health and safety at work during field work and in laboratory.**	**K_W13**
skills	**1**	**EP5**	**The student is able to gain core description, sampling and perform basic laboratory analysis of sediments.**	**K_U05**
	2	**EP6**	**Student recognizes the types of sediments and their structural and textural features.**	**K_U05**
	3	**EP7**	**Student is able to prepare sedimentological profiles based on its data.**	**K_U06**
	4	**EP8**	**Student is able to draw conclusions about the sedimentary environment based on the results of research on the structural and textural features of the sediments.**	**K_U08**

social competences	**1**	**EP10**	**Student is ready to recognize the importance of knowledge in solving cognitive and practical problems and updating knowledge in the field of sedimentology**	**K_K02**

CONTENT	Semester	No. of hours	
			w tym e-learning
Subject title: **Sedimentology**			
Format of instruction: **lecture**			
1. **Physicochemical and environmental conditions of the sedimentation process and mechanisms of transport and sedimentation.**	3	3	0
2. **Textural features of sediments: determining the size of components, graphical presentation of the results of grain size analysis, grain size parameters and their interpretation, morphological features of sediment components.**	3	3	0
3. **Types of sedimentary structures**	3	3	0
4. **Post-sedimentary transformations of sediments.**	3	2	0
5. **Characteristics of land sedimentation environments: fluvial, limnic, glacial, aeolian.**	3	5	0
6. **Characteristics of marine sedimentation environments: littoral, sublittoral, hemipelagic, eupelagic.**	3	5	0
7. **Characteristics of transitional sedimentation environments: beach, sandy barriers and lagoons, tidal flats, estuaries, deltas.**	3	5	0
8. **Introduction to facies analysis and sequence stratigraphy.**	3	4	0
Format of instruction: **discussion classes**			
1. **Methodology of facies analysis with elements of sequence stratigraphy.**	3	4	0
2. **Sedimentological profiles.**	3	2	0
3. **Interpretation of sedimentary environments based on information on physicochemical, structural, textural and geochemical features of sediments.**	3	4	0
Format of instruction: **laboratory**			
1. **Familiarization with the methodology of field work and sedimentological documentation: macroscopic observations and description of sediment samples, sampling for lab work**	3	5	0
2. **Grain size analysis by various methods.**	3	5	0
3. **Calculation of statistical grain size parameters and interpretation of the results of grain size analyses.**	3	5	0

Modes of delivery	**Multimedia presentation (lecture). Practical classes in the laboratory. Interpretation of sedimentological research results.**	
Assessment methods		No. of learning outcome from the syllabus
	EGZAMIN PISEMNY	**EP1,EP2,EP3,EP4**
	PRACA PISEMNA/ ESEJ/ RECENZJA	**EP5,EP6,EP7,EP8**
	ZAJĘCIA PRAKTYCZNE (WERYFIKACJA POPRZEZ OBSERWACJĘ)	**EP10,EP9**
	Metody i formy weryfikacji efektów uczenia się mogą zostać zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach określonych w Regulaminie Studiów Uniwersytetu Szczecińskiego.	
Grading criteria	**Positive assessment of the written exam and correct performance of all practical exercises.**	
	Grade calculation principles	
	Course grade: arithmetic mean of exam grades, written work and practical classes.	

Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	3	sedymentologia		Arytmetyczna	
	3	sedymentologia [wykład]	egzamin		
	3	sedymentologia [ćwiczenia]	zaliczenie z oceną		
	3	sedymentologia [laboratorium]	zaliczenie z oceną		

Basic reading	Gradziński R., Kostecka, A., Radomski, A., Unrug, R. (1986): Zarys sedymentologii, Wyd. Geologiczne, Warszawa
	Jaroszewski W. (red.) (1986): Przewodnik do ćwiczeń z geologii dynamicznej, Wyd. Geologiczne, Warszawa
Supplementary reading	Allen P.A. (2000): Procesy kształtujące powierzchnię Ziemi, PWN, Warszawa
	Allen R.L. (1977): Fizyczne procesy sedymentacji, PWN Warszawa
	Ciesielczyk J., Jabłońska M., Kozłowski K. (2006): Geologia dla studentów geografii (Rozdział 7: Skały osadowe), Wyd. Uniwersytetu Śląskiego, Katowice
	Huneke H., Mulder T., (2010): Deep-Sea Sediments, Elsevier Science
	Książkiewicz M. (1979): Geologia dynamiczna, Wyd. Geologiczne, Warszawa
	Miall A. D. (1990): Principles of sedimentary basin analysis, Springer - Verlag, Berlin
	Miall A.D., (2010): Principles of Sedimentary Basin Analysis, Springer
	Miall, A.D., (2016): Stratigraphy. A modern synthesis., Springer
	Miall, A.D., (2016): The Geology of Fluvial Deposits, Springer
	Mycielska-Dowgiałło E. (red.) (1998): Struktury sedymentacyjne i postsedymentacyjne w osadach czwartorzędowych i ich wartość interpretacyjna, Wyd. Uniwersytetu Warszawskiego
	Nicols, G., (2009): Sedimentology and stratigraphy, Wiley
	Osadczuk K. (2004): Geneza i rozwój wałów piaszczystych Bramy Świny w świetle badań morfometrycznych i sedymentologicznych, 211 s., Wydawnictwo Naukowe Uniwersytetu Szczecińskiego,, Szczecin
	Racinowski R., Szczypek T., Wach J. (2001): Prezentacja i interpretacja wyników badań uziarnienia osadów czwartorzędowych, Wyd. Uniwersytetu Śląskiego
	Reineck H. E, Singh I. B. (1973): Depositional sedimentary environments, Springer - Verlag, Berlin

STUDENT WORKLOAD

	No. of hours	
		W tym e-learning
Contact hours	**55**	**0**
Participation in test / exam	**2**	**0**
Preparation for contact hours	**10**	**0**
Private reading and studying	**12**	**0**
Participation in tutorials	**10**	**0**
Preparation of project / essay / etc.	**6**	**0**
Preparation for test / exam	**5**	**0**
TOTAL workload	**100**	
ECTS credits	**4**	

<table>
<tr><td colspan="4">*Course*: **Socio-economic effects of threats**</td></tr>
<tr><td colspan="4">*Field of study*: geography</td></tr>
<tr><td>*Class format*</td><td>*Class hours*</td><td>*ECTS*</td><td>*Language*</td></tr>
<tr><td>*Lectures*</td><td>15</td><td rowspan="2">3</td><td rowspan="2">English</td></tr>
<tr><td>*Practicals*</td><td>15</td></tr>
<tr><td>*Coordinator:*</td><td colspan="3">Natalia Sypion-Dutkowska, Ph.D.</td></tr>
<tr><td>*Course objectives:*</td><td colspan="3">Getting to know the effects of natural disasters and natural disasters arising from the occurring geohazards.
Understanding how to prevent and minimize their negative socio-economic effects</td></tr>
<tr><td>*Prerequisites:*</td><td colspan="3">Basic knowledge about the types of geohazards. Completion of subjects: physical geography and geography socio-economic and natural disasters and environmental crises in the history of the earth</td></tr>
<tr><td colspan="4">*Course content matter*</td></tr>
<tr><td colspan="4">1. Areas of occurrence of the largest geohazards and the level of socio-economic development
and development of individual regions
2. Economic consequences of natural and natural disasters
3. Natural disasters and economic losses caused by them in Poland
4. Counteracting and minimizing the effects of natural disasters
5. Crisis management and actions taken in the event of natural disasters and
natural disasters
6. Analysis of the development of areas exposed to various types of natural disasters and catastrophes
natural in Poland and grade
7. Condition of flood protection in Poland? selected examples
8. Examples of adaptation to natural conditions to minimize the effects
potential natural disasters</td></tr>
<tr><td>*Instruction methods*</td><td colspan="3">informative and problem lecture, discussion, case study, work with the map, documents analysis</td></tr>
<tr><td>*Course approval format and condition*</td><td colspan="3">Written exam covering knowledge of lectures and recommended basic literature.
Completing exercises based on class attendance and activity, as well as partial grades received during the semester for the correct performance of all tasks.</td></tr>
<tr><td>*Required reading*</td><td colspan="3">O. Kjekstad, L. Highland 2009, Economic and social impacts of landslides, in K. Sassa P. Canuti (Eds.) Landslides – Disaster Risk Reduction (pp 573-587) Springer, Berlin.
Herlander Mata-LimaI; Andreilcy Alvino-BorbaII; Adilson PinheiroIII; Abel Mata-LimaV; José António Almeida 2013, Impacts of natural disasters on environmental and socio-economic systems: what makes the difference? http://www.scielo.br/scielo.php?pid=S1414-753X2013000300004&script=sci_arttext&tlng=en</td></tr>
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