<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>

<table>
<tr><td colspan="4">*Course*: Basics of palaeoceanography</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">3</td><td rowspan="2">English</td></tr>
<tr><td>*Practicals*</td><td>15</td></tr>
<tr><td>*Coordinator:*</td><td colspan="3">Przemysław Dąbek, PhD.</td></tr>
<tr><td>*Course objectives:*</td><td colspan="3">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.</td></tr>
<tr><td>*Prerequisites:*</td><td colspan="3">Basic knowledge and skills related to geology, marine geology, geochemistry, biostratigraphy. Good spoken and written English skills.</td></tr>
<tr><td colspan="4">*Course content matter*</td></tr>
<tr><td colspan="4">1. The aim of the paleoceanography. Ocean in the Earth system.
2. Sampling, dating and analyzing marine sediments.
3. Origin and evolution of the oceans.
4. Selected geochemical cycles. Application of isotopes of selected elements in paleoceanography.
5. Environmental reconstructions of paleotemperature, paleosalinity, biological production, paleotides, paleodepths.
6. Overview on marine micro and macro fossils.</td></tr>
<tr><td>*Instruction methods*</td><td colspan="3">Multimedia lecture and scientific papers for discussion and expanding the lectures' content. Laboratory work with scientific equipment.</td></tr>
<tr><td>*Course approval format and condition*</td><td colspan="3">Passing test from the lectures' contents (60%) and making project from the laboratory work (40%).</td></tr>
<tr><td>*Required reading*</td><td colspan="3">Selley, R.C., Cocks, R.,Plimer, I. (Ed.). 2005. Encyclopedia of Geology. Elsevier
Hillaire-Marcel, C. & de Vernal, A. (Ed.). 2007. Proxies in late Cenozoic paleoceanography. Elsevier
Fisher, G. & Wefer, G. (Ed.). 1999. Use of proxies in paleoceanography: Examples from the South Atlantic. Springer
Seibold, E. & Berger, W. (Ed.). 2017. The sea floor: an introduction to marine geology. Springer
Haq. B.U & Boresma, A. (Ed.). 1978. Introduction to marine micropaleontology. Elsevier</td></tr>
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<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>

<table>
<tr><td colspan="4">*Course*: Biological oceanography</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>30</td><td rowspan="2">7</td><td rowspan="2">English</td></tr>
<tr><td>*Laboratory*</td><td>45</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 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.</td></tr>
<tr><td>*Prerequisites:*</td><td colspan="3">Basic knowledge of biology, ecology and physical oceanography acquired in previous oceanography courses</td></tr>
<tr><td colspan="4">*Course content matter*</td></tr>
<tr><td colspan="4">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</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">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</td></tr>
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<table>
<tr><td colspan="4">*Course*: Biology and Protection of Marine Fish</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>17</td><td rowspan="2">5</td><td rowspan="2">English</td></tr>
<tr><td>*Practicals*</td><td>20</td></tr>
<tr><td>*Coordinator:*</td><td colspan="3">Prof. Wojciech Piasecki, Ph.D., D.Sc.</td></tr>
<tr><td>*Course objectives:*</td><td colspan="3">Introduction to the basics of fish biology and their protection</td></tr>
<tr><td>*Prerequisites:*</td><td colspan="3">Knowledge of systematic ichthyology and fish morphology</td></tr>
<tr><td colspan="4">*Course content matter*</td></tr>
<tr><td colspan="4">Fish physiology. Fish reproduction. Fish diseases. Fisheries management. Protection of marine fishes. Fish physiology. Fish reproduction. Fish diseases. Fisheries management. Marine aquarium.</td></tr>
<tr><td>*Instruction methods*</td><td colspan="3">Lectures using Power Point presentation and video. Practical classes with the use of the Internet and live and fixed biological preparations. A trip to a marine aquarium or ichthyological museum</td></tr>
<tr><td>*Course approval format and condition*</td><td colspan="3">Positive grade from lectures (exam) and practical classes</td></tr>
<tr><td>*Required reading*</td><td colspan="3">Carl J. Walters, Steven J. D. Martell (2004): Fisheries Ecology and Management, Princeton University Press, USA

Douglas E. Facey, Brian W. Bowen, Bruce B. Collette, Gene S. Helfman (2022): The Diversity of Fishes: Biology, Evolution and Ecology, Willey and Sons , USA

Hart; Jd Reynolds Jd; John Reynolds (2002): Handbook of Fish Biology and Fisheries : Fish Biology, Wiley-Blackwell, USA</td></tr>
</table>

<table>
<tr><td colspan="4">*Course*: Coastal protection</td></tr>
<tr><td colspan="4">*Field of study:* physical 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">3</td><td rowspan="2">English</td></tr>
<tr><td>*Practicals*</td><td>15</td></tr>
<tr><td>*Coordinator:*</td><td colspan="3">Dr hab. Joanna Dudzińska-Nowak, Ph.D, D.Sc.</td></tr>
<tr><td>*Course objectives:*</td><td colspan="3">The use of coastal engineering as a solution in case coastal erosion and threats of slope stability.
The influence of different hydro-engineering structures and coastal protection measures to coastal processes.</td></tr>
<tr><td>*Prerequisites:*</td><td colspan="3">coastal zone geomorphology and dynamics</td></tr>
<tr><td colspan="4">*Course content matter*</td></tr>
<tr><td colspan="4">1. Coastal processes and long term evolution.
2. Hydro-engineering structures and coastal protection measures.
3. Effects of different hydro-engineering structures and coastal protection measures to coastal processes.</td></tr>
<tr><td>*Instruction methods*</td><td colspan="3">Multimedia presentations, discussion, independent computer work, lab measurement, work report</td></tr>
<tr><td>*Course approval format and condition*</td><td colspan="3">Lectures: Positive evaluation of the written exam
Exercises: passing the written assignment and all the work done in the class, passing the semester test</td></tr>
<tr><td>*Required reading*</td><td colspan="3">Cooper J.A.G., Pilkey O.H. (eds.) (2012) Pitfalls of Shoreline Stabilization: Selected Case Studies, Poutledge, London-New York
Reeve D., Chadwick A., Fleming Ch. (2004): Coastal Engineering. Processes, Theory and Design Practice, Spon Press, Taylor & Francis Grou, London–New York</td></tr>
</table>

Course:

Control, monitoring and prevention of biological hazards

(Kontrola, monitorowanie i profilaktyka zagrożeń biologicznych)

Field of study:

Exploatation of natural resources

Class format	*Class hours*	*ECTS*	*Language*
Lectures	15	3	English
Practicals	15		
Fieldworks	15		
Coordinator:	Dr hab. Izabella Rząd, prof. US		
Course objectives:	To familiarize students with hazards of biological origin occurring in organic natural resources of animal origin. To learn about the risk of diseases caused by biological agents occurring in organic natural resources exploited by humans. To learn about zoonoses.		

Program content

Lectures:

Environmental aspects of biological hazards.
Endemic and epidemiological threats in Poland, Europe and the world.
Factors conducive to the spread of dangerous parasites for people and domesticated animals in the environment
Risk of infections and diseases caused by parasites present in nature.
Risk of infections and diseases caused by parasites present in food.
Parasites and zoonoses.
Host behaviour and the risk of the spread of parasites
Entities responsible for the biological safety of harvested organic natural resources of the environment.

Practicals:

Organic natural resources of animal origin as a potential source of biological agents posing a threat to human health.
The water, soil and air environment as routes of the spread of parasites
Economic losses caused by parasitic infections in people and in wild and domesticated animals.
Control and eradication of dangerous parasites for humans and domesticated animals.
Invasive parasite species and vectors.
The use of GIS in analysis of the distribution of parasites and their vectors.
Programmes for monitoring and eradicating parasitic infections and diseases.

Fieldworks:

Monitoring and control of potentially hazardous biological agents present in organic natural resources. The conduct of institutions, organizations and companies in ensuring the biological safety of harvested organic natural resources.

Educational methods	Multimedia presentation, group work, individual work, laboratory analyses, work with a microscope
Course approval format and condition	The final grade is the arithmetic mean of the grades from lectures and exercises in a 1:1 ratio
Literature	

<table>
<tr><td colspan="4">*Course*: Cultivation of diatoms for industry application</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>10</td><td rowspan="2">3</td><td rowspan="2">English</td></tr>
<tr><td>Practicals</td><td>12</td></tr>
<tr><td>*Coordinator:*</td><td colspan="3">Ewa Górecka, Ph.D.</td></tr>
<tr><td>*Course objectives:*</td><td colspan="3">The objective of the course is to provide students with a comprehensive understanding of diatoms, their ecology, physiology and methods of cultivation. Through lectures, practical training during laboratories and group discussions students will learn how to isolate and culture diatoms to meet the required expectations of industry and how to manipulate diatom cultures for industrial applications like bioremediation, biofuels, biomaterial or nanotechnology. By the end of the course students will be able to design and conduct experiments to optimize growth and productivity of diatom cultures and to assess potential of sustainable application of diatoms.</td></tr>
<tr><td></td><td colspan="3"></td></tr>
<tr><td colspan="4">*Program content*</td></tr>
<tr><td colspan="4">1. Introduction to diatoms: definition, ecology, and diversity.
Laboratory exercise 1: microscopic observation of diatoms and their morphology
Field trip: collecting living diatom samples
2. Diatom culture techniques & growth kinetics
Laboratory exercise 2: media preparation, sterilization, and isolation techniques
Laboratory exercise 3: eco-physiological experiments on diatoms strains
3. Diatom biomass production: harvesting, drying, and preservation
Laboratory exercise 4: PBR construction and diatom inoculation
4. Diatom chemical composition: biosilica, lipids, carbohydrates, and proteins
Laboratory exercise 5: biomass harvesting, lipid and biosilica extraction
5. Diatom biotechnology applications, bioprospecting and sustainability</td></tr>
<tr><td>*Educational methods*</td><td colspan="3">Lectures
Laboratory exercises
Group discussions
Field trip</td></tr>
<tr><td>*Course approval format and condition*</td><td colspan="3">Performing practical tasks, Summary of conducted tasks in a form of a written work (report).</td></tr>
</table>

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

<table>
<tr><td colspan="4">*Subject*: Diatomological workshops (Warsztaty malakologiczne)</td></tr>
<tr><td colspan="4">*Field of study*: Geology</td></tr>
<tr><td>*Form of classes*</td><td>*Class hours*</td><td>*ECTS*</td><td>*Language*</td></tr>
<tr><td>laboratory</td><td>15</td><td rowspan="2">2</td><td rowspan="2">English</td></tr>
<tr><td></td><td></td></tr>
<tr><td>*Coordinator:*</td><td colspan="3">Przemysław Dąbek, PhD.</td></tr>
<tr><td>*Objectives of the subject:*</td><td colspan="3">Acquiring knowledge and skills useful in lithostratigraphic studies and paleoenvironmental reconstruction based on the analysis of the taxonomic composition of diatoms.</td></tr>
<tr><td>*Requirement:*</td><td colspan="3">Basic knowledge on geology, biology and light microscopy. Good written and spoken English skills.</td></tr>
<tr><td colspan="4">*Program content*</td></tr>
<tr><td colspan="4">1. Principles of work in the diatomological laboratory.
2. Light and electron microscopy.
3. Diatoms as a tool in geological studies. Morphological and biological characteristics of diatoms.
4. Methodology for laboratory preparation of microfossils from sediments.
5. Diatomological analyzes: species identification, qualitative and quantitative analysis.
6. Reconstruction of sedimentation conditions and paleoenvironmental changes based on diatomological analysis.
7. Isolation and culture of live diatoms.</td></tr>
<tr><td>*Educational methods*</td><td colspan="3">Multimedia presentation, group work, performing experiments and analyzes as well as summary reports, working with a microscope and specimens</td></tr>
<tr><td>*Form and conditions of passing the subject*</td><td colspan="3">Performing practical tasks, developing results in the form of a written work (report) and a multimedia presentation.</td></tr>
<tr><td>*Literature*</td><td colspan="3">Smol, J.P., Stoermer, E.F. (2010): The diatoms: applications for the environmental and earth sciences, Cambridge University Press
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</td></tr>
</table>

Course:

Ecological and geographical aspects of parasitism

(Ekologiczne i geograficzne aspekty pasożytnictwa)

Field of study:

Exploatation of natural resources

Class format	*Class hours*	*ECTS*	*Language*
Lectures	15	4	English
Practicals	15		

Coordinator:	Dr hab. Izabella Rząd, prof. US
Course objectives:	Understanding the ecology of parasitic organisms and their geographical distribution on Earth. Recognizing factors influencing the development of populations of various parasite species. Recognition of introduced, expansive and invasive parasite species in various geographical areas. Readiness to assess the population status of various parasite species in various types of ecosystems.

Program content

Lectures:

1. Parasites and parasitism - definitions, history and current state of research - 5 hours
2. Ecology of the parasite-host system – 5 hours
3. Geographical distribution of human and animal parasites – 5 hours

Practicals:

1. Recognition of parasite species and their transmission routes – 5 hours
2. Life cycles of parasites and characteristics of parasite habitats - 5 hours
3. Populations and communities of parasites – 5 hours

Educational methods	Multimedia presentation, group work, individual work, performing laboratory tests, working with a microscope.
Course approval format and condition	The final grade is the arithmetic mean of the grades from lectures and exercises in a 1:1 ratio

Literature	Mandatory: Poulin R. Evolutionary ecology of parasites. Pronceton University Press, Princeton and Oxford, 2007. Lucius R. I in. Biology of parasites. Wiley-VCH Verlag GmbH, 2017 Magurran A.E. Measuring biological diversity. Willey-Blackwell, 2004. Supplementary: Timothy M. Goater Parasitism: The Diversity and Ecology of Animal Parasites. Cambridge University Press Mehlhorn H. Animal Parasites Diagnosis, Treatment, Prevention. Springer, 2016.

<table>
<tr><td colspan="4">*Subject*: Ecological aspects of industrial livestock farming in the Baltic Sea region</td></tr>
<tr><td colspan="4">*Field of study*: exploitation of natural resources, 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="2">4</td><td rowspan="2">English</td></tr>
<tr><td>laboratory</td><td>20</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 ecological threats and challenges related to industrial farming and possibilities of counteracting them</td></tr>
<tr><td>*Requirement:*</td><td colspan="3">Basics of general ecology and geography</td></tr>
<tr><td colspan="4">*Program content*</td></tr>
<tr><td colspan="4">1. Introduction – definition, terminology and concepts
2. Conditions determining the impact of industrial livestock farming on the natural environment
3. Characteristics of the industrial livestock production in the Baltic Sea catchment area
4. Risks from large-scale livestock production identified in the Baltic Sea catchment area
5. Preventing negative consequences of intensive livestock production
6. Recommendations for reduction and control of nutrient runoff from industrial animal farms in the baltic sea catchment area</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. Skorupski J. et al. 2013. Report on Industrial Livestock Farming in the Baltic Sea Region – Environmental Protection Context. Coalition Clean Baltic. Uppsala
2. Skorupski J. 2012. Industrial Animal Farming in Poland as a major threat to the natural environment of the Baltic Sea. Coastline Reports 20: 45-53
3. HELCOM. 2021. Baltic Sea Action Plan. 2021 update. Baltic Marine Environment Protection Commission. Helsinki</td></tr>
</table>

<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, Ph.D., D.Sc., Associate Professor</td></tr>
<tr><td>*Course objectives:*</td><td colspan="3">Introducing students to the methodology of facies analysis and sequence stratigraphy and prepare them for the practical use of this knowledge in geological research of sedimentary basins.</td></tr>
<tr><td>*Prerequisites:*</td><td colspan="3">Basic understanding of geology, sedimentology and geophysics</td></tr>
<tr><td colspan="4">*Program content*</td></tr>
<tr><td colspan="4">Sedimentary environments and their facies features. Concepts of depositional system and facies models. Sedimentary architecture. Accommodation space and shoreline trajectories. Sequence stratigraphic surfaces and stratal terminations. Stratal stacking pattern and systems tracts. Seismic stratigraphic interpretation of depositional systems.</td></tr>
<tr><td>*Instruction methods*</td><td colspan="3">Lectures and laboratory exercises</td></tr>
<tr><td>*Course approval format and condition*</td><td colspan="3">Exam and assessment of practical exercises</td></tr>
<tr><td>*Required reading*</td><td colspan="3">• Allen P.A. & Allen P.R. (1990): Basin Analysis. Principles & Applications., Blackwell
• Catuneanu O. (2006): Principles of Sequence Stratigraphy, Elsevier
• Catuneanu, O. (2002): Sequence stratigraphy of clastic systems: concepts, merits, and pitfalls, Journal of African Earth Sciences 35
• Embry, A.F. (2009) Practical Sequence Stratigraphy. Canadian Society of Petroleum Geologists, Canada.
• Lobo, F. J., & Ridente, D. (2014). Stratigraphic architecture and spatio-temporal variability of high-frequency (Milankovitch) depositional cycles on modern continental margins: An overview. Marine Geology, 352.
• Miall, A.D. (1997): The Geology of Stratigraphic Sequences. 2nd Edition, Springer
• Patruno, S., & Helland-Hansen, W. (2018). Clinoforms and clinoform systems: Review and dynamic classification scheme for</td></tr>
</table>

	shorelines, subaqueous deltas, shelf edges and continental margins. Earth-Science Reviews, 185, • Reineck H. E. & Singh I. B. (1980): Depositional Sedimentary Environments, Springer. • Stoker, M.S., Pheasent, J.B. & Josenhans, H. (1997): Seismic methods and interpretation, In: Davies et al. (eds), Glaciated Continental Margins: An Atlas of Acoustic Images, Chapman and Hall

<table>
<tr><td colspan="4">*Course:* **Fish diseases**</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>10</td><td rowspan="2">4</td><td rowspan="2">*English*</td></tr>
<tr><td>*Practicals*</td><td>10</td></tr>
<tr><td>*Coordinator:*</td><td colspan="3">Prof. Wojciech Piasecki, Ph.D., D.Sc.</td></tr>
<tr><td>*Course objectives:*</td><td colspan="3">Learning the basics of fish diseases (ichthyopatology)</td></tr>
<tr><td>*Prerequisites:*</td><td colspan="3">High-school biology</td></tr>
<tr><td colspan="4">*Course content matter*</td></tr>
<tr><td colspan="4">Lectures
1. Physiological vs. pathological processes in fish organisms
2. Introduction to fish immunology
3. Major pathogens in taxonomic arrangement (Bacteria, viruses)
4. Major pathogens in taxonomic arrangement (Protista)
5. Major pathogens in taxonomic arrangement (Flatworms)
6. Major pathogens in taxonomic arrangement (Roundworms)
7. Major pathogens in taxonomic arrangement (Crustacea)
Classes
1. Major pathogens in taxonomic arrangement
2. Fish necropsy.
3. Power points presentations of students</td></tr>
<tr><td>*Instruction methods*</td><td colspan="3">Lecture, practical training with fish parasites, microscopic observations</td></tr>
<tr><td>*Course approval format and condition*</td><td colspan="3">Single-choice test (lectures)
Individual PowerPoint presentation (classes)</td></tr>
<tr><td>*Required reading*</td><td colspan="3">Noga E. (2010) Fish Disease - Diagnosis and Treatment. 2nd edn. Iowa State University Press, 544 pp.
Smith, S.A. (Ed.). (2019). Fish Diseases and Medicine (1st ed.). CRC Press. https://doi.org/10.1201/9780429195259
Rohde K. (Ed.) (2005): Marine parasitology, CSIRO Publishing, Victoria, Australia.</td></tr>
</table>

<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>

<table>
<tr><td colspan="4">*Course*: Geology of the seabed and ocean floor</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>30</td><td rowspan="2">4</td><td rowspan="2">English</td></tr>
<tr><td>Practicals</td><td>30</td></tr>
<tr><td>*Coordinator:*</td><td colspan="3">Dominik Zawadzki, Ph.D.</td></tr>
<tr><td>*Course objectives:*</td><td colspan="3">(1) Presenting the basics of the marine geological processes
(2) Presenting the structure and composition of the oceanic crust
(3) Presenting the geological history and the evolution of the oceans.</td></tr>
<tr><td>*Prerequisites:*</td><td colspan="3">Basic understanding of geology, oceanography, physics and chemistry.</td></tr>
<tr><td colspan="4">*Course content matter*</td></tr>
<tr><td colspan="4">(1) Objectives and principles of marine geology
(2) Methods used in marine geology
(3) Structure of the Earth
(4) Structure and Composition of the Oceanic Crust
(5) Distribution of the marine sediments
(6) Origin and evolution of the ocean basins through time
(7) Provinces of the Ocean Floor
(8) Active and passive continental margins
(9) Plate tectonics
(10) Plate boundaries (divergent, convergent, transform fault boundaries)</td></tr>
<tr><td>*Instruction methods*</td><td colspan="3">Lecture</td></tr>
<tr><td>*Course approval format and condition*</td><td colspan="3">Written examination for completing the course.</td></tr>
<tr><td>*Required reading*</td><td colspan="3">Seibold, E., Berger, W.H. 2017. *The Sea Floor - an introduction to marine geology.* Springer
Edward Tarbuck E., Lutgens F., Tasa D.,: *Earth An Introduction to Physical Geology* (any edition)
Frisch, Meschede, Blakey, 2011. *Plate Tectonics Continental Drift and Mountain Building*
Erickson J., 2002: *Marine Geology: Exploring the New Frontiers of the Ocean.* The Living Earth</td></tr>
</table>

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		

Course: Geosystem of coastal dunes (bio- and geodiversity)			
Field of study: Oceanography			
Class format	*Class hours*	*ECTS*	*Language*
Lectures	20	4	English
Practicals	15		
Coordinator:	Labuz T.A., prof US		
Course objectives:	1. Knowledge about coastal dunes morphology and dynamics 2. Knowledge about biodiversity of dunes in different climate zones 3. Significance and utility of coastal dunes		
Program content			
1. Morphology and types of coastal dunes 2. Biodiversity and habitats 3. Species important for dune dynamics 4. Coastal dunes dynamics and development 5. Coastal dunes in different climate 6. Management, utility and protection of coastal dune systems 7. Coastal dunes as important environment in coastal areas (for human and nature)			
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	1.Davidson-Arnott R., 2010, Introduction to coastal processes & geomorphology 2.Łabuz T.A., 2016, Coastal dunes: changes of their perception and environmental management. In: Finkl Ch.W., Makowski Ch., Environmental management and Governance, Springer 3.McLachlan A., Brown A., 2006, The ecology of sandy shores, Academic Press 4. Łabuz T.A., 2016, A review of field methods to survey coastal dunes - experience based on research from South Baltic coast. Journal of Coastal Conservation 20(2), pp. 175-190 5. Coastal wiki: http://www.coastalwiki.org/wiki/Main_Page		

<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:

Health quality of natural resources of animal origin
(Jakość zdrowotna zasobów naturalnych pochodzenia zwierzęcego)

Field of study:

Exploatation of natural resources

Class format	*Class hours*	*ECTS*	*Language*
Lectures	15	3	English
Practicals	15		
Fieldworks	15		

Coordinator:	Dr hab. Izabella Rząd, prof. US
Course objectives:	To learn the important environmental factors for the health quality of natural resources of animal origin. To recognize threats reducing the health quality of natural resources of animal origin. Readiness to assess the health quality of natural resources of animal origin.

Program content

Lectures:

Health quality of natural resources of animal origin - its sources, characteristics and indicators
Role of geographic factors in assessment of the health quality of natural resources of animal
Role of ecological factors in assessment of the health quality of natural resources of animal origin
Role of zoological factors in assessment of the health quality of natural resources of animal origin
Protection of the health of animals harvested by humans for economic purposes
Health safety of organic natural resources of animal origin

Practicals:

Biotic environmental factors influencing the health quality of animal species exploited by humans
Abiotic environmental factors influencing the health quality of animal species exploited by humans
Methods of assessing the health quality of food of animal origin harvested as a result of exploitation
Parasites of animals harvested by humans for economic purposes, an overview of species
Parasitic zoonoses
Planning and coordination of measures for maintaining and assessing the health quality of natural resources of animal origin
Preventive measures for protecting the health safety of natural resources of animal origin

Fieldworks:

Conduct of institutions, organizations and companies in ensuring the biological safety of harvested organic natural resources.

Educational methods	Multimedia presentation, group work, individual work, laboratory analyses, work with a microscope
Course approval format and condition	The final grade is the arithmetic mean of the grades from lectures and exercises in a 1:1 ratio
Literature	

Course: **Hydrobiology**			
Field of study: Oceanography			
Class format	*Class hours*	*ECTS*	*Language*
Lectures	15	4	English
Practicals	20+10 fieldworks		
Coordinator:	Agnieszka Szlauer-Łukaszewska, Ph.D., D.Sc.		
Course objectives:	Understanding the specifics of different aquatic environments, familiarizing with groups of organisms living in different types of waters, problems of degradation, protection, testing of water quality and economic use of water.		
Prerequisites:	Completed biology and chemistry course in Oceanography		

Course content matter

Lectures:
1. Specificity of living conditions in water
2. Impact of physical and edaphic factors on biotic phenomena
3. Biology of aquatic organisms
4. Anatomical adaptation to life in water
5. Ecological formations
6. Biological characteristics of the aquatic environment: lakes, dam reservoirs, ponds, rivers, sources and estuaries
7. Productivity of ecosystems, habitat diversity
8. Taxonomic composition of selected aquatic ecosystems
9. Applied hydrobiology: eutrophication, saprobization, acidification

Practical:
1. Methods for biological characterization of aquatic environments
2. Methods of collecting biological data in aquatic environments
3. Taxonomic identification of aquatic organisms

Instruction methods	Presentation based on the author's scenario of lectures, practical exercises in a biological laboratory, field classes
Course approval format and condition	Written exam - mixed test with open and multiple choice questions, Passing practical classes on the basis of correctly completed practical tasks.
Required reading	Krebs, Ch.J. 2009. Ecology: The Experimental Analysis of Distribution and Abundance. University of British Columbia, Vancouver Cain, S. 2018. Freshwater Biology. Larsen and Keller Education

<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: **Land and marine sedimentation environments**			
Field of study: Geology			
Class format	*Class hours*	*ECTS*	*Language*
Seminars	20	3	English
Practicals			
Coordinator:	Jakub Miluch		
Course objectives:	(1) Presenting the methods and sources of data used in sedimentology analysis. (2) Presenting the diversity of marine and terrestrial sedimentary environments and processes occurring in them.		
Prerequisites:	Basic understanding of geology, oceanography, sedimentology, mineralogy, petrography, geomorphology.		
Course content matter			
(1) Types of syn-and post-depositional structures sedimentation. (2) Textural properties of the sediments. (3) Characteristic of marine sedimentary basins (littoral, sublitoral, hemipelagic, eupelagic) (4) Characteristic of terrestrial sedimentary basins (fluvial, glacial, aeolian, lacustrine) (5) Characteristic of transitional sedimentary basins (estuary, delta, lagoon) (6) Advanced sedimentological software. (7) Basics of facies analysis and sequential stratigraphy.			
Instruction methods	Lecture, laboratory		
Course approval format and condition	Written examination for completing the course.		
Required reading	Huneke H., Mulder T., 2010. *Deep-Sea Sediments* Elsevier Science. Miall A.D., 2010. *Principles of Sedimentary Basin Analysis* Springer Miall, A.D., 2016. *The Geology of Fluvial Deposits* Springer Miall, A.D., 2016. *Stratigraphy. A modern synthesis*. Springer.		

<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">Przemysław Śmietana, 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>

<table>
<tr><td colspan="4">*Course*: Marine geology</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>30</td><td rowspan="2">5</td><td rowspan="2">English</td></tr>
<tr><td>Practicals</td><td>15+15 fieldworks</td></tr>
<tr><td>*Coordinator:*</td><td colspan="3">Dominik Zawadzki, Ph.D.</td></tr>
<tr><td>*Course objectives:*</td><td colspan="3">(1) Presenting the methods and sources of data used in marine geology
(2) Presenting the geological history and the evolution of the oceans.
(3) Presenting the structure and composition of the oceanic crust</td></tr>
<tr><td>*Prerequisites:*</td><td colspan="3">Basic understanding of geology, oceanography.</td></tr>
<tr><td colspan="4">*Course content matter*</td></tr>
<tr><td colspan="4">(1) Objectives and principles of marine geology;
(2) Methods used in marine geology
(3) Structure of the Earth
(4) Structure and Composition of the Oceanic Crust
(5) Distribution of the marine sediments
(6) Origin and evolution of the ocean basins through time
(7) Provinces of the Ocean Floor
(8) Active and passive continental margins
(9) Plate tectonics
(10) Plate boundaries (divergent, convergent, transform fault boundaries)
(11) Ophiolite complexes
(12) Oceanic mineral resources in the light of the UNCLOS.</td></tr>
<tr><td>*Instruction methods*</td><td colspan="3">Lecture, laboratory</td></tr>
<tr><td>*Course approval format and condition*</td><td colspan="3">Written examination for completing the course.</td></tr>
<tr><td>*Required reading*</td><td colspan="3">Seibold, E., Berger, W.H. 2017. *The Sea Floor - an introduction to marine geology.* Springer
Edward Tarbuck E., Lutgens F., Tasa D.,: *Earth An Introduction to Physical Geology* (any edition)
Frisch, Meschede, Blakey, 2011. *Plate Tectonics Continental Drift and Mountain Building*
Erickson J., 2002: *Marine Geology: Exploring the New Frontiers of the Ocean.* The Living Earth</td></tr>
</table>

<table>
<tr><td colspan="4">*Course:* **Marine ichthyology and parasitology**</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">Prof. Wojciech Piasecki, Ph.D., D.Sc.</td></tr>
<tr><td>*Course objectives:*</td><td colspan="3">Learning the basics of ichthyology and marine parasitology</td></tr>
<tr><td>*Prerequisites:*</td><td colspan="3">High-school biology</td></tr>
<tr><td colspan="4">*Course content matter*</td></tr>
<tr><td colspan="4">Lectures
1. Morphology, biology, and physiology of fish
2. Fisheries vessels and fishing gear
3. Mariculture
4. Foundations of fish parasitology
5. Foundations of marine invertebrates’ parasitology
Classes
1. Foundations of fish systematics
2. Individual PowerPoint presentations on selected topics</td></tr>
<tr><td>*Instruction methods*</td><td colspan="3">Lecture, practical training with fish and fish parasites, microscopic observations</td></tr>
<tr><td>*Course approval format and condition*</td><td colspan="3">Single-choice test (lectures)
Individual PowerPoint presentation (classes)</td></tr>
<tr><td>*Required reading*</td><td colspan="3">Helfman G., Collette B.B., Facey D.E., Bowen B.W. (2007): The diversity of fishes: Biology, evolution, and ecology 2nd edition,
Willey-Blackwell, UK.
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.</td></tr>
</table>

<table>
<tr><td colspan="4">*Course*: Natural disasters and environmental crises in the Earth history</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>20</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 Dąbek, PhD.</td></tr>
<tr><td>*Course objectives:*</td><td colspan="3">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.</td></tr>
<tr><td>*Prerequisites:*</td><td colspan="3">General knowledge, skills, and social competences in the field of Earth and environmental sciences. Good written and spoken English skills.</td></tr>
<tr><td colspan="4">*Course content matter*</td></tr>
<tr><td colspan="4">1. Impact events, their age and traces in the form of craters, meteorites and tectites, distribution on the globe.
2. Ice Age and Glacial Events in Earth's History - Geological Evidence; concept of Snowball Earth; environmental effects of glacial events.
3. Great crises of the organic world (great extinctions) - traces in the geological record, causes.
4. "Salt crises" - Permian salt crisis, Messina crisis, causes, environmental effects
5. Earthquakes, tsunamis, floods - causes, geological and morphological traces, distribution, effects local, regional and global environmental
6. Natural gas explosions (CO2, CH4) - environmental causes and effects</td></tr>
<tr><td>*Instruction methods*</td><td colspan="3">Informative and problem lecture; case study; event analysis. Reading and discussing scientific literature.</td></tr>
<tr><td>*Course approval format and condition*</td><td colspan="3">Test in subject content and recommended literature.</td></tr>
<tr><td>*Required reading*</td><td colspan="3">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
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
and other related scientific papers.</td></tr>
</table>

<table>
<tr><td colspan="4">*Course:* **Ocean-Atmosphere System**</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>10</td><td rowspan="2">4</td><td rowspan="2">English</td></tr>
<tr><td>*Practicals*</td><td>10 + 5 fieldworks</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 learn about: basic processes featuring System Ocean-Atmosphere, and changes related to climate warming</td></tr>
<tr><td>*Prerequisites:*</td><td colspan="3">Basic knowledge in physics and chemistry</td></tr>
<tr><td colspan="4">*Course content matter*</td></tr>
<tr><td colspan="4">Lectures:
1. Interactions in Ocean-Atmosphere
2. Winds over the oceans
3. Generation of oceanic currents
4. Marine aerosols
5. Exchange of gases
6. Oxygen supersaturations
7. Air-Water pollution transfer and related impact on biosphere
8. Bubble mediated bacteria scavenge and aerosolization
9. Bubble mediated assembly of RNA/DNA and enforcing of viability
10. Global importance of Ocean-Atmosphere interactions on geochemistry
Practicals:
1. Experimental measurements of a thermal features of surface microlayer
2. Experimental observations of water vapor rotational features
3. Experimental records of rising bubbles rotational features
4. Experimental observations of marine aerosol formation and related physical properties
5. TriOS and WetLab experimental instrumentation
6. Experimental measurements from pier and coastal Station in Międzyzdroje</td></tr>
<tr><td>*Instruction methods*</td><td colspan="3">Lectures, practicals, 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">Marshal J. Plumb A.: 2008: Atmosphere, Ocean and Climate Dynamics.
Marks R., 2008: Dissolved oxygen supersaturation and its impact on bubble formation in the southern Baltic Sea coastal waters. Hydrology Research. Vol. 39, No 3, 229-236, doi:10.2166/nh.2008.021.
Marks R., 2014: Bubble Rotational Features – Preliminary Investigations. Oceanography: Open Access, 2: 128, doi: 10.4172/2332-2632.1000128.</td></tr>
</table>

	Kowalewska-Kalkowska H., Marks R., 2015: Estuary, Estuarine Hydrodynamics. Encyklopedia of Marine Geosciences, doi: 10.1007/978-94-007-6644-0_164-1. Dordrecht, 235-238. Marks R., 2015: Sub-bubble Bi-pirouette Splicing of Cationic and Anionic Bases as a Process of RNA/DNA Creation. Oceanography: Open Access, 2: 128, doi: 10.4172/2332-2632.1000135. Marks R., Górecka E., McCartney K., Borkowski W., 2019: Rising bubbles as mechanism for scavenging and aerosolization of diatoms. Journal of Aerosol Science, Vol. 128, 79-88. Marks R., Suwalski G., 2006: Remotely operated ship used for measurements in coastal waters. Pol. J. of Environ. Stud. Vol. 15, No. 3, 437-440. Marks R., 2019: Water Vapor Induced Airborne Rotational Features. Meteorology Hydrology and Water Management, 7, 2, 29-47, DOI: https://doi.org/10.26491/mhwm/104634.

<table>
<tr><td colspan="4">*Course:* Paleooceanography</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>*Seminars*</td><td>45</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">Przemysław Dąbek, PhD.</td></tr>
<tr><td>*Course objectives:*</td><td colspan="3">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.</td></tr>
<tr><td>*Prerequisites:*</td><td colspan="3">Basic knowledge and skills related to geology, marine geology, geochemistry, biostratigraphy. Good spoken and written English skills.</td></tr>
<tr><td colspan="4">*Course content matter*</td></tr>
<tr><td colspan="4">1. The aim of the paleoceanography. Ocean in the Earth system.
2. Sampling, dating and analyzing marine sediments.
3. Origin and evolution of the oceans.
4. Selected geochemical cycles. Application of isotopes of selected elements in paleoceanography.
5. Environmental reconstructions of paleotemperature, paleosalinity, biological production, paleotides, paleodepths.
6. Overview on marine micro and macro fossils.</td></tr>
<tr><td>*Instruction methods*</td><td colspan="3">Multimedia lecture and scientific papers for discussion and expanding the lectures' content. Laboratory work with scientific equipment.</td></tr>
<tr><td>*Course approval format and condition*</td><td colspan="3">Passing test from the lectures' contents (60%) and making project from the laboratory work (40%).</td></tr>
<tr><td>*Required reading*</td><td colspan="3">Selley, R.C., Cocks, R.,Plimer, I. (Ed.). 2005. Encyclopedia of Geology. Elsevier
Hillaire-Marcel, C. & de Vernal, A. (Ed.). 2007. Proxies in late Cenozoic paleoceanography. Elsevier
Fisher, G. & Wefer, G. (Ed.). 1999. Use of proxies in paleoceanography: Examples from the South Atlantic. Springer
Seibold, E. & Berger, W. (Ed.). 2017. The sea floor: an introduction to marine geology. Springer
Haq. B.U & Boresma, A. (Ed.). 1978. Introduction to marine micropaleontology. Elsevier</td></tr>
</table>

Course: **Physical Oceanography**			
Field of study: Oceanography			
Class format	*Class hours*	*ECTS*	*Language*
Lectures	30	7	English
Practicals	30 + 15 *Fieldworks*		
Coordinator:	Roman Marks, Ph.D., D.Sc.		
Course objectives:	Students will learn about: basic rules and processes in maritime and oceanic compartments, interpretation of experimental data related to changes in oceanic system		
Prerequisites:	Basic knowledge in physics and chemistry		

Course content matter

Lectures:

1. Physical properties of sea water: molecular features of sea water, salinity, temperature, density
2. Thermodynamics 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. Experimental measurements of a thermal features of surface microlayer
2. Experimental observations of electrical and magnetic features of distil and sea water
3. Methods to investigate rising bubbles and their physical properties
4. Experimental observations of marine aerosol formation and physical properties
5. TriOS and WetLab experimental instrumentation
6. Set of experiments conducted at coastal Station in Międzyzdroje

Instruction methods	Lectures, exercises, field and laboratory experiments
Course approval format and condition	Oral exam
Required reading	Knauss J.A.: 2005: Introduction to Physical Oceanography, Waveland Pr Inc. Krüger O., Marks R., Graßl, 2004: H. Influence of pollution on cloud reflectance. J. Geophysical Res. Vol. 109, D24210, doi:10.1029/2004JD004625. Marks R., Suwalski G., 2006: Remotely operated ship used for measurements in coastal waters. Pol. J. of Environ. Stud. Vol. 15, No. 3, 437-440.

	Marks R., 2008: Dissolved oxygen supersaturation and its impact on bubble formation in the southern Baltic Sea coastal waters. Hydrology Research. Vol. 39, No 3, 229-236, doi:10.2166/nh.2008.021. Marks R., 2014: Bubble Rotational Features – Preliminary Investigations. Oceanography: Open Access, 2: 128, doi: 10.4172/2332-2632.1000128. Kowalewska-Kalkowska H., Marks R., 2015: Estuary, Estuarine Hydrodynamics. Encyklopedia of Marine Geosciences, doi: 10.1007/978-94-007-6644-0_164-1. Dordrecht, 235-238. Marks R., 2015: Sub-bubble Bi-pirouette Splicing of Cationic and Anionic Bases as a Process of RNA/DNA Creation. Oceanography: Open Access, 2: 128, doi: 10.4172/2332-2632.1000135. Marks R., Górecka E., McCartney K., Borkowski W., 2019: Rising bubbles as mechanism for scavenging and aerosolization of diatoms. Journal of Aerosol Science, Vol. 128, 79-88. Marks R., 2019: Water Vapor Induced Airborne Rotational Features. Meteorology Hydrology and Water Management, 7, 2, 29-47, DOI: https://doi.org/10.26491/mhwm/104634.

<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: **Remote sensing of marine environment**			
Field of study: oceanography			
Class format	*Class hours*	*ECTS*	*Language*
Lectures	15	5	English
Practicals	20		
Coordinator:	Joanna Dudzińska-Nowak, Ph.D., D.Sc.		
Course objectives:	The use of remote sensing methods for measurements and interpretation of phenomena occurring in the marine environment		
Prerequisites:	Principles of the remote sensing		
Course content matter			
1. Characteristic of the satellite sensors dedicated open sea research and examples of the use. *2. Characteristic of the airborne sensors dedicated coastal zone research and examples of the use.* *3. Sources and availability of the satellite remote sensing data dedicated open sea research.* *4. Sources and availability of the airborne remote sensing data dedicated coastal zone research.*			
Instruction methods	Multimedia presentations, discussion, independent computer work, lab measurement, work report		
Course approval format and condition	Lectures: Positive evaluation of the written exam Practicals: passing the written assignment and all the work done in the class, passing the semester test		
Required reading	Robinson, I.S. (1985): Satellite oceanography, Ellis Horwood Sabins F.F. (1987): Remote Sensing - Principles and Applications, Jon Wiley and Sons Meidment, D.R. (2002): Arc Hydro: GIS for Water Resources, Esri Press Seelye, M. (2004): An introduction to Ocean Remote Sensing, Cambridge University Press		

<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: **Sedimentology**			
Field of study: Geology			
Class format	*Class hours*	*ECTS*	*Language*
Lectures	30	4	English
Practicals	10 + 15 labs		
Coordinator:	Dominik Zawadzki, Ph.D., Jakub Miluch		
Course objectives:	(1) Presenting the methods and sources of data used in sedimentology analysis. (2) Presenting the basics of the sedimentary basins		
Prerequisites:	Basic understanding of geology, mineralogy, petrography, physics and chemistry.		
Course content matter			
(1) Physicochemical and environmental conditions of the sedimentation process as well as transport mechanisms and sedimentation. (2) Textural properties of the sediments. (3) Characteristic of marine sedimentary basins (littoral, sublitoral, hemipelagic, eupelagic) (4) Characteristic of terrestrial sedimentary basins (fluvial, glacial, aeolian, lacustrine) (5) Characteristic of transitional sedimentary basins (estuary, delta, lagoon) (6) Introduction to sedimentological methods: grain size analysis (sieving, laser, areometric) (7) Grain size parameters (8) Introduction to the basic sedimentological software.			
Instruction methods	Lecture, laboratory, fielworks		
Course approval format and condition	Written examination for completing the course.		
Required reading	Nicols, G., 2009. *Sedimentology and stratigraphy*. Wiley. Huneke H., Mulder T., 2010. *Deep-Sea Sediments* Elsevier Science. Miall A.D., 2010. *Principles of Sedimentary Basin Analysis* Springer Miall, A.D., 2016. *The Geology of Fluvial Deposits* Springer Miall, A.D., 2016. *Stratigraphy. A modern synthesis*. Springer.		

<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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<table>
<tr><td colspan="4">*Course*: Software in geology</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></td><td rowspan="2">3</td><td rowspan="2">English</td></tr>
<tr><td>Practicals</td><td>45</td></tr>
<tr><td>*Coordinator:*</td><td colspan="3">Jakub Miluch, MSc</td></tr>
<tr><td>*Course objectives:*</td><td colspan="3">Student will gain knowledge in mathematical, statistical and computer methods in geological data analysis by learning how to gather, extract, visualize and analyze data, using specified software dedicated to geologists and geoscientists.</td></tr>
<tr><td></td><td colspan="3"></td></tr>
<tr><td colspan="4">*Program content*</td></tr>
<tr><td colspan="4">(1) Introduction to software in geology
(2) Generation of borehole data sheets
(3) Graphic design of geological maps
(4) Computer tools in geological data analysis
(5) Modeling of geological proxies
(6) Geological databases</td></tr>
<tr><td>*Educational methods*</td><td colspan="3">Practical classes</td></tr>
<tr><td>*Course approval format and condition*</td><td colspan="3">Report submission</td></tr>
<tr><td>*Literature*</td><td colspan="3">*Surfer User's Guide*, Golden Software (https://downloads.goldensoftware.com/guides/Surfer17UserGuide.pdf)
Grapher User's Guide, Golden Software (https://downloads.goldensoftware.com/guides/Grapher17UsersGuide.pdf)
Pourgasemi H.R., 2019, *Spatial Modeling in GIS and R for Earth and Environmental Sciences*, Elsevier
Petrelli M., 2021. *Introduction to Python in Earth Science Data Analysis: From Descriptive Statistics to Machine Learning*, Springer Nature</td></tr>
</table>